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EDITORIAL.

IT IS RARELY that discussion is both penetrating and polite. Usually it is either penetrating and rasping, or else polite and inane. Recent proceedings at technical societies widely separated by geographical position accentuate this tendency. To discuss another man's views only to emphasize points of minor disagreement is no less unprofitable than the habit of offering a meaningless eulogy which does not concern itself with the subject in hand. It is for this reason that written discussions appear to be more generally profitable than those spoken in open meeting. When putting thoughts to paper the personal element is more apt to be placed in the background, and there is a more manifest effort to get at the realities of the problem in hand.

WE QUITE AGREE with our excellent contemporary, the British Columbia *Mining Record*, that Mr. S. F. Parrish, the late manager of Le Roi mine, is entitled to a hearing before condemnation on account of the fiasco at Rossland. When Mr. Parrish lived in Colorado he was one of the most highly esteemed of the many capable engineers who contributed to the development of the Leadville district.

THE DESCRIPTION of the operations at the St. Eugene mine, to be found on another page, illustrates the manner in which the beneficiation of silver-lead ores has been handicapped in British Columbia, by reason of a poor lead market and high smelter charges. It is pleasing to record an improvement in conditions and a consequent resumption of operations at this representative property.

THE FAMOUS old mining district of Bendigo, in Australia, is exhibiting healthy vigor. During 1903 the output was 224,747 oz. of gold, as against 190,164 oz. the year before; the total dividends declared by the mining companies also increased from £319,370 to £213,437. The first quarter of 1904 shows a yield of 60,505 oz., this being a further increase as compared to the March quarter of last year. While milling methods at Bendigo are still antiquated, there is no district in the world where actual mining of ore is more economically carried

out. This is proved, for instance, by the proportion of dividends earned on the exploitation of low-grade ores. It averages more than five dollars for every ounce extracted. That is a high ratio.

THE ADOPTION of fine grinding in flint mills previous to cyanidation—that is, of intentionally creating a slime—has been adopted by Messrs. G. A. and H. A. Denny at the New Goch mine, on the Rand, and is to be followed up at the Cinderella Deep and in other mills under their direction. We understand that experiments made at El Oro, Mexico, also indicate that the use of tube mills for fine grinding permits of a rapid extraction by cyanide solutions. At several other mines similar trials are being made, and we expect that this will prove to be one of the most useful developments in recent practice. The pioneer work with these flint or tube mills was done at Kalgoorlie, as has been recorded in this JOURNAL from time to time.

IN VIEW of the approaching fortieth anniversary of Dr. Chas. F. Chandler's appointment as professor at the foundation of the School of Mines, Columbia College, it is intended to render some acknowledgment of his services, and to this end the Alumni Association of the Schools of Science at the University is raising funds to present Dr. Chandler's portrait to the University. Old Columbia School of Mines men all over the world will be interested in this matter, and will be glad of the opportunity to testify their regard and appreciation for a professor who has done so much toward the development of their *alma mater*. As professor of chemistry, as dean, and as an individual Dr. Chandler has won the regard of successive classes at Columbia, and of many other men who were not so fortunate as to graduate from the great school of mines of New York City.

THE SITUATION in Colorado continues to be bad, in so far as the highest interests of the State are concerned. We feel assured, and are bound to say, that the spirit of lawlessness is bad whether manifested by excited citizens or by reckless agitators, except when due to the latter it is obviously reprehensible while when chargeable to the former such disorder is likely to be excused. On another page we publish a letter from Mr. Arthur Winslow, one of the most respected members of the Mine Operators' Association. He states their side of the case ably; whether it is convincing, our readers will judge. It is a matter of regret to us that so many of the best professional men have become so obsessed by their resentment of the brutal tyranny of the labor agitators that they are willing to go to great length in getting rid of them. The lawful method is the only one which will prove lasting; it is the only one which will save a great mining region from that tendency to anarchy which has marked the political debauchery and labor riots of the past ten years.

IN CONNECTION with the complaint made in Western Australia that a group of mines was employing alien—especially Italian—labor to the detriment of the resident population, it is interesting to note that the manager of the mines referred to has given instructions to his superintendents to "dismiss any man not capable of speaking or understanding the English language." No intelligent sympathy with the institutions of a country is possible until the language of its people is understood, and we are inclined to the belief that the action above recorded is one of the best methods of checking labor troubles, many of which arise from a misunderstanding of the spirit of popular government.

GERMAN CEMENT INDUSTRY.

Owing to heavy production and resulting demoralization in market prices through keen competition, the cement makers of Germany are gradually agreeing on the 'sales agency' plan, which has proved so successful in the potash salts industry. Fourteen cement works in Rhenish-Westphalia have already announced that they are in an incorporated syndicate with limited liability which appraises membership according to productive capacity by allotting one share to each thousand casks of annual output. For each share of working capital the members deposit in cash $6.25, and as security $12.50 in bills. A member may sell 40 per cent of his quota, and should his orders call for a larger quantity, the syndicate is privileged to substitute the brands of other members whose business may not be equally prosperous. The selling price will be fixed annually by the syndicate, and any surplus from sales will be divided among the members in the ratio of their shareholdings. As yet no allotment of exports has been made, but it is obligatory for members in the syndicate to pay a tax of $1.25 for every 10 tons exported. What effect this tax will have on export prices may be conjectured. American consumers imported from Germany last year 245,966 long tons of cement, which was equivalent to 59.3 per cent of the total foreign receipts. It will be interesting to learn also what effect the formation of this German syndicate will have on aggressive competitors in Belgium. Belgium furnished America last year with 131,710 tons of cement, or 31.8 per cent of the total imports, indicating that competition with Germany here is growing. The United States is the largest consumer of cement in the world, and in 1903 used approximately 4,697,843 long tons, which is considerably more than in the previous year.

U. S. MINING LAW.

A few days ago the editor of this JOURNAL received an official invitation to offer suggestions for the amelioration of the law dealing with mineral lands, the matter having been taken up by the Commission on Public Lands, of which Mr. Gifford Pinchot is secretary. It is scarcely necessary for our readers to be told that among mining engineers, Dr. R. W. Raymond is the recognized authority on the interpretation and application of those unfortunate regulations which are popularly, but not officially, known as the U. S. Mining Law. Therefore we suggested to Mr. Pinchot and we urged upon Dr. Raymond that the best manner of getting at the views of properly qualified mining men was to publish an article in our columns, to be written by Dr. Raymond and explaining the desire for criticism and suggestion of changes in regulations which so vitally concern the well-being of the mining industry. Dr. Raymond kindly consented to carry out this plan, and on another page of this issue there will be found a clear statement of the case at his capable hands. We trust that many mining engineers, saturated with the unpleasant experience of litigation over ore deposits, will take the trouble, as public-spirited citizens, to embody their views on this subject, addressing their communications either to Mr. Pinchot or to this office. It may appear desirable to publish some of the comment in our columns, with a view to eliciting further opinions on specific points. We commend the matter to the earnest consideration of our readers.

CIRCULAR OR RECTANGULAR SHAFTS FOR COAL MINES.

One of the distinctions between coal and metal mining is that the former deals usually with a more or less regular deposit underlying practically all the ground that the mining company is developing, while metalliferous deposits are notoriously irregular and usually of limited extent. Hence, while there are very few metal mines where the engineer knew he had a 20 years supply of ore before he sunk a shaft, coal mines are opened on similar knowledge every day. This justifies the colliery engineer in making large outlays on permanent improvements. Thus in Pennsylvania and elsewhere in the eastern States the shafts recently sunk are, as a rule, lined with concrete, the high initial cost being offset by the probable freedom from charges for repairs. At one old anthracite mine near Scranton the shaft was practically retimbered four times in 12 years. Mine lumber that but a few years ago could be had in the newly opened bituminous districts for $12 per 1,000 ft. now costs $30, and the price is advancing. So that, as far as coal mines in the East are concerned, American engineers have begun to follow European practice and wood will never again be used to the extent that it has been.

With the change from wood to concrete the question of cross section is bound to arise; in fact, it is already under discussion. American engineers have sunk shafts of rectangular section, because using timber that shape is easiest to maintain, hence cheapest. With concrete, however, where the item of maintenance is unimportant, the question of the best cross section resolves itself into the factors of capacity and first cost. We do not know that any shafts of circular section have been sunk at Pennsylvania coal mines, but at a mine just opened on the Monongahela river the chief engineer has shown reluctance to adopt outright European practice, and his perception of its merits, by making the main shaft elliptical in section, a compromise between the rectangle and the circle that possesses little merit. Before long some engineer will throw over all prejudice and sink a shaft of circular cross section.

The chief advantage to be gained is the economy in concrete. A round tube will resist much higher pressure than a rectangular one with two wide sides; again, as a circle represents one limit of the ratio of perimeter to area, a given amount of material arranged in a circle will enclose most space. Therefore a circular shaft for given resistance to pressure and for a given area of cross section will require least concrete for lining.

The chief objections urged against following European practice have been (1) the difficulty of maintaining guides, without the frequent cross buntons necessary in a rectangular shaft, (2) the small size of the cars that can be hoisted in proportion to the area of the shaft section, that is, the amount of waste space in a circular shaft, and (3) increased difficulty in ventilation.

Of these objections only the last calls for much comment. It is quite possible by using steel beams at intervals to have as durable and safe a method of securing guides as anyone need desire. The large area of the shaft is no disadvantage if the shaft is used for a downcast; in fact, it prevents the movement of cages from interfering with the air current. The last objection, however, is not easily answered. Generally speaking, a shaft used for hoisting will not be used as an upcast, both on account of the contaminated mine air increasing the danger of an explosion, and because the top works, necessary where the fan exhausts, are a check upon the rapid output of coal. A shaft of circular section cannot with economy be divided into compartments with one for an upcast, hence there is need of a separate air shaft. Where, however, an air shaft is already sunk, or where the coal is near surface, both these objections lose weight.

In short, main hoisting shafts of circular cross sections will be in use before long at Pennsylvania coal mines. The question is, what engineer will be the first to sink one?

WORDS AND THEIR WAYS.

From time to time we have drawn attention to common errors in the use of technical terms. The literature of mining suffers from carelessness in this regard, and if we refer to the matter so often it is in the belief that greater accuracy of expression will contribute to lucidity of thought and enhance the value of recorded observations in the wide field of mining and metallurgy. Previous references to this subject will be found in these columns under date of October 24, 1903, and January 21, 1904.

The words 'dip,' 'hade' and 'pitch' are used confusedly; we would suggest that 'dip' be applied to the inclination from the horizontal of strata and lodes, while 'hade' should be reserved for the inclination of faults. The angle made by an ore-shoot—not ore 'chute'—in the plane of a lode is its 'pitch;' this also, for the sake of uniformity, ought to be measured from the horizontal.

At one time it was usual in metallurgy to employ the word 'tank' for a receptacle erected to hold either water or solution, while a 'vat' was an excavation made in the ground; but this distinction no longer obtains. It would seem better to consider 'tanks' as receptacles for water; they become 'vats' when they are filled with chemical solutions; in other words, 'vat' is the metallurgical equivalent of 'tank.' One does not speak of a vat of drinking water, although a 'wine vat' is a distinctly recognized institution, nor should one speak of a tank of cyanide solution. Words are rendered useful, like men, by giving each an allotted task.

'Drift' and 'drive' are words commonly bungled; a miner *drives* his working ahead and the result of it is a *drift*. One should not say that 20 feet of drifting was accomplished, or the north drive was advanced 20 feet, but 20 feet of *driving* was done and the north drift was extended for that distance. Both words come from the Anglo-Saxon *drifan*.

Do not say 'electrical' and 'geological'—unless you have to—because 'electric' and 'geologic' are shorter and mean the same. It savors too much of the Western barber's shop with its steplike growth from a tonsorial parlor to a tonsorialist and then to a tonsorialistical establishment!

'Slimes' and 'sands' are excessively plural, like a Mormon's household. 'Slime' and 'sand' serve the same purpose; the plural, as commonly employed, is a careless colloquialism; one may as well always speak of the 'ores' of a mine, when no differentiation is intended. The practice becomes inconvenient when compounding; thus, 'slimes plant' and 'sands vats' are evidently clumsy as compared to slime-plant and sand-vats. Where no distinct varieties or grades of slime or of sand are in question, why use the plural? This carries the idea that there are several kinds of slime or sand undergoing treatment and if such be the case, the plural has a meaning; but, if the plural alone is to be adopted as a generic term, it precludes differentiation on those rare occasions when such a suggestion is required, and it is a sloppy use of words without any apparent excuse. The same can be said of 'concentrates'; the singular is better unless it is intended to convey the idea that the material consists of several varieties of mineral; which is sometimes, but by no means always, the case. As a glaring example of the misuse of technical terms we would instance that prevalent in Gilpin county, Colorado, where the concentrate saved on shaking tables is known as "tailings"; this usage is quite established in this old district, chiefly because no one made it his business to protest.

There are other matters of style worthy of mention; but we fear to tread upon dangerous ground. The split infinitive is a matter of taste—and the want of it. Many engineers will have heard of the tramp who asked the Boston lady for a little sustenance, and when she asked him to split wood in return for her hospitality he declined because he did not care to split anything, not even the infinitive. He was given several kinds of pie.

We have ventured to suggest the discarding of certain terms; there is one the adoption of which is likely to prove useful. Lord Avebury—he is known better to science as Sir John Lubbock—has suggested that 'manywhere' would fill a long felt want; we need an equivalent signifying "in many places." We have everywhere, anywhere and nowhere; why not manywhere? The word seems to fill a long felt want; it would be useful manywhere.

MARKET CONDITIONS.

June 15.

Quiet still prevails in the metal markets and buying is limited. Copper has been dull all the week. The outlook for domestic buying is slightly better, though consumers still are holding off. Demand from abroad is fair. Tin quotations declined during the week, but to-day recovered a little. The lead market shows no change, though the American Smelting & Refining Company has refused to reduce its quotations. Spelter still sells slowly. There has been no improvement in prices in the Joplin ore market, but sales during the past week were heavy.

Silver is fairly steady, but no particular demand for the metal is reported.

In the iron and steel markets conditions are practically unchanged, though low prices of pig iron are drawing out inquiries at Pittsburg for deliveries into the third quarters. The Southern furnaces continue busy, and are stocking iron. There is little activity in the demand for finished products.

The production of bituminous coal is active in Alabama and in the Pittsburg district. In the West the markets are generally quiet. Along the Atlantic seaboard dulness prevails.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The doubly refracting calcspar from Iceland is largely used for polarisation apparatus. It is expensive, pure lumps being worth as much as $25.50 a lb., and it seldom sells at less than $6.50 or $7 a pound.

Basalt comes from the Latin *basaltes*, the name of a dark, hard marble. Basalt is a compact, dark rock, the origin of which afforded the subject of one of the first great disputes in geologic history.

Gangue is the equivalent of veinstone; it applies to the earthy or non-metal-bearing parts of the lode. It comes from an Anglo-Saxon word meaning a group or collection of persons or things, as, for example, a gang of men.

Andesite is derived from the Andes, of South America, where this rock is particularly prevalent. The quartzose variety of this rock is called dacite, after the ancient Roman province of Dacia, which is now covered by Transylvania.

At the beginning of the nineteenth century, about 10,000,000 tons of coal were mined annually in Great Britain. In 1903 the output was 230,323,391 tons, of which 27.5 per cent, or 63,422,548 tons, was consumed outside of the United Kingdom.

Serpentine is always of secondary nature, being formed by the alteration of ferro-magnesian rocks, such as pyroxenites and peridotites. It usually carries chromite, and is the only source from which this mineral is obtained in commercial quantities.

The oxides of the cerium and yttrium groups, known as 'rare earths' acquired industrial importance in 1886, when the invention of the Auer von Welsbach incandescent gas lighting system was made public. Since then the search for rare earths has been eager.

Gypsum in a transparent crystalline state is known as selenite; when finely fibrous, as satinspar, and when like marble, as alabaster. More than half the world's supply comes from France, where the annual production is nearly 2,500,000 metric tons. Ordinary gypsum is chiefly used in the manufacture of plaster of paris and cements and as a fertilizer; satinspar, for beads, and alabaster for working into vases and beautiful statuettes.

A greaser is an automatic diamond sorter; it is a table built up of five steps covered with a coating of thick grease and vibrates rapidly as the concentrates are allowed to drop on to the top step gradually. The diamonds adhere, while the garnets, zircons, mica, magnetite, pyrite and other minerals are washed off. The machine greatly lessens the quantity of material to be sorted by hand, and it has proved perhaps the most noteworthy labor-saving device used at the South African diamond mines. A wide-awake laborer invented the machine.

NITRATE PROFITS AND PROSPECTS.

Surprising as it may seem the nitrate of soda industry, after paying an ocean freight and export duty to consuming markets, equivalent to 44 per cent of the selling price alongside steamer in Chile, has shown a total net profit of approximately 27 per cent for the fiscal year ending March 31, 1904. This profit, though large, has been somewhat impaired by the reduction made in the individual quota of exports, particularly of the older *oficinas* whose original productive capacity has been cut 26 per cent since the combination began work, in 1901. At present there are no less than 94 *oficinas* enrolled, among which will be divided in the ensuing fiscal year exports of 1,635,454 long tons. This allotment is the largest on record, and means a further reduction of 3 per cent in the quotas, making 29 per cent on the original quantity of 1,417,233 tons, four years ago.

Fortunately, the consumption has grown apace, making the record at 1,483,068 tons in the past fiscal year. The manufacturers of fertilizers and of blasting powder are the largest users, and in the United States the consumption has increased over 31 per cent during the year. With the energetic propaganda has come higher prices, which, in most cases fully compensate for the enhanced cost of labor and supplies at the *oficinas*.

During the fiscal year ending March 31, 1904, of the 94 plants in the combination, 85 exported a total of 1,435,996 long tons of nitrate of soda. The average value alongside steamer in Chile was $35.64 per ton, or $51,178,897. There was paid for ocean freight to consuming markets an average of $3.46 per ton, or $4,968,546. The Chilean government's share from the export duty of $12.32 per ton, amounted to $17,691,481. The net profit to the *oficinas*, after providing for operating expenses, etc., averaged $9.77 per ton, or $14,029,681, which, it is interesting to note, is $3,661,800, or about 26 per cent, less than the export tax collected by the government. The year's profit was used principally in paying dividends at rates from 5 to 29 per cent on the shares of incorporated companies, principally British; by increasing the various reserve funds, and in establishing the new 'statutory reserve.' This 'statutory reserve' will absorb 5 per cent of the annual profits; it is a new amendment to the Chilean incorporation law. In the case of one large company—the Alianza—the contribution to this fund amounted to £3,300, which is equivalent to 1s. 1d. (26c.) per ton on the annual exports of 60,955 tons nitrate of soda. This company earned net profits of £111,195 from June 17 to December 31, 1903, and besides paying 6 per cent in dividends, disbursed £40,000 as a 4 per cent dividend on the old shares at the time of reorganization, in July, 1903. During reconstruction the company also deducted from profits £11,000 to meet debenture interest.

Some idea of the profits of the *oficinas* in the past year may be had from the accompanying tabulation.

Company.	1902. Net Profit.	1902. Balance Forward.	1902. Dividend. %	1903. Net Profit.	1903. Balance Forward.	1903. Dividend. %
*Alianza	£172,657	£1,543	10	£111,195	£4,289	6
Lagunas	46,354	11,446	5	46,079	....	..
New Paccha & Jazpampa	5,005	766	6	5,590	387	7.9
Salar del Carmen	44,289	1,135	10	37,637	1,348	10
San Donato	6,282	8,604	2.5	8,750	4,420	4
San Jorge	50,607	11,293	10	22,464	1,257	7.5
San Lorenzo	.....	....	..	31,206	6,276	10
Santa Rosa	19,843	9,101	2.5	21,123	2,171	2.5
			..	31,206	6,276	10

*For 1902, full year; 1903, six months.

The net profit of the Alianza Company in 1903 was £111,195, or 6 per cent on the capitalization and exports of only 13,772 tons in 1903 has paid in dividends 22 per cent on its preferred stock, and 7 per cent on the common. Another interesting feature, shown in the table above, is the heavy decrease in the profit of the San Jorge Company. The shortage is explained partly by the stoppage of work at the *oficina* for two months for the purpose of increasing the number of boiling tanks from 12 to 16, in order to facilitate the treatment of the *costra* and lower-grade material. It is intimated that by shipping this year the balance of last year's quota, the loss in profit as shown above will be fully made up.

Now to consider the railway and steamship service—a most important branch of the nitrate of soda industry—there are seven railways, whose proportionate share of the exports last year was as follows: Nitrate Railways Company running to the ports of Iquiqui and Pisagua, 48.2 per cent; Agua Santa to Caleta Buena, 18.5 per cent; Anglo-Chilean to Tocopilla, 13.4 per cent; Junin to Junin, 9.6 per cent; Taltal to Taltal, 5.3 per cent; Antofagasta to Antofagasta, 2.7 per cent; Aguas Blancas to Caleta Coloso, 2.3 per cent. Compared with 1902 there has been a substantial increase in the shipments from Junin and Tocopilla, but from Iquiqui and Pisagua the tonnage has shown a marked falling off. Prospects for 1904 are very good for the Taltal and Aguas Blancas railways, as several new *oficinas* in that territory are nearing completion. Earnings of the Nitrate Railways Company, the largest shipper, permit the payment of 5 per cent in dividends annually, and in 1903 its working expenses absorbed 49.4 per cent. Some profit has also been made by the company from the sale of water.

In steamship circles, competition has created such low freight rates that most of the ten companies are running their boats without insurance. It is hinted that should this demoralization in freights continue the shipping trade will eventually be controlled by a few strong hands. One of the more important concerns, the Nitrate Producers' Steamship Company, owning six boats with a deadweight carrying capacity of 38,800 tons, paid 7.5 per cent in dividends during the year ending April 30, 1904. The gross profit was £27,530, and after deducting general expenses, interest, directors' fees, income-tax, and dividends, there has been placed to reserve for depreciation, etc., the sum of £11,500, leaving £1,338 to be carried forward.

With regard to the future it may be said that the producers' combination will terminate in two years, thus fulfilling its five years' agreement to regulate exports by the consumption. Meanwhile producers, realizing a systematic shrinkage in their quota of exports, are practising more economy. Where a company has purchased land at the auction sale last November, an effort is being made to reduce treatment charges by mixing virgin material with the *costras* from the older properties. In this way the percentage of nitrate in the product going to the boiling tanks is increased, and brings a better market price.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of the ENGINEERING AND MINING JOURNAL.

THE SITUATION IN COLORADO.

The Editor:

Sir.—I have read with interest your editorial concerning the Colorado situation, in the JOURNAL of the 9th. I quite agree with you that the conditions in Cripple Creek approach those of anarchy; I also agree with you that those conditions are to be deplored, that lawlessness of all kinds should be suppressed and that the only fundamental cure is not only in the awakening of an enlightened public opinion but in its assertion and enforcement. But, on the other hand, I equally believe that there should be discrimination used in passing judgment on the several acts, and that allowances must be made for the provocations suffered and for the objects striven for. There can be no question as to who were the original instigators and perpetrators of these crimes in Colorado, and who are consequently to blame for the present situation. The acts of minc operators and citizens' alliances, which may be classed as illegal, have been almost entirely in self protection, or, at most, in a few cases, in retaliation. It is a notable fact that there has not resulted a single conviction for the crimes of violence and murder in Colorado, which are traceable to union causes. Where law is lax and the proper officials ignore and fail to attempt to punish glaring crimes, there is certainly something to be said in justification of the man or the association of men who take the law into their own hands, even to the extent of retaliative acts. A man who sees an enemy draw his gun is justified in shooting that enemy, even though technically that enemy may not be proved to have intended to kill the man; a man or a group of men who know that another group is conspiring to ruin and destroy their life and property and who see no adequate protection or redress by regular channels, cannot be expected to allow themselves to be sacrificed passively. Extenuating circumstances are recognized in the framing and execution of all laws; they affect the judgment of both judge and juries. There are certain great principles of right and wrong which are above the letter of the law, and to these all acts must be ultimately referred. I think you will agree with this in principle, and that our differences are more apparent than real, and lie in a confusion of terms. A departure from the letter of the law is always to be deplored and is always dangerous to the individual and to the community; the motives and objects are the only justification. The greatest danger is that all bounds of right and reason may be overstepped. I do not think this will be done in Colorado. The sense of right, the love of true liberty, the abhorrence of anarchy and license, which the people of Colorado share with the other true citizens of this country, is a great and certain safeguard against this. Words and threats may be indulged in when under the influence of anger or indignation, and some hasty acts may be committed which second and more sober thought will retract and condemn, but I feel sure that good will come in the end; that this epoch of disorder and crime will develop hatred of such conditions, will teach people what disregard of the law inevitably leads to, will strengthen and sustain a permanent love of peace and regard for others. But one thing seems certain, and that is that the people of Colorado are determined to put an end to this reign of terror in the mining camps, to stamp out criminal organizations and leaderships, cost what it may, and even if the ways and means of peace and of law-abiding communities are not followed and have to be, to a degree, ignored, the object is and the result in the end will be Law and Order.

ARTHUR WINSLOW.

Boston, June 13, 1904.

BREAKING UP FURNACE SOWS.

The Editor:

Sir.—Replying to an inquiry in the issue of May 26, 'Breaking up Furnace Sows.' I made an attempt at the Golden smelter last fall to cut up a sow composed of sulphides, metallic iron and fire brick 4 ft. square and 8 ft. long. I had an electric current available of 500 volts and 250 amperes. The wire was No. 2 copper wire.

The first attempt resulted in burning out the fuses. Resistance was introduced in the form of a water barrel and two copper plates fastened to the ends of the cut wire, the plates being immersed in the water acidulated with hydrochloric acid. The free end of one wire was babbitted to a metallic portion of the sow, the other wire was terminated by a socket carrying a carbon ¼ in. by 2 in. in section. Old battery carbons were used. My face was protected by an asbestos mask, my eyes with dark goggles. I ought to have smoked the glass densely, as the experiment resulted in inflaming my eyes.

When the carbon approached the sow the flame leaped from the metal and a slag ran down. I was able to burn several holes in the sow three inches deep, but when any brick was encountered it failed to melt, though it became white hot.

I believe that the sow of black copper could be burned through, if it is solid metal, by beginning at the bottom and working upward. If it contains fire brick, it can only be broken by drilling with a ratchet drill and blasting with dynamite. I have heard that this process is in use in the Lake Superior region for cutting mass copper. If C. B. N. wishes further information, I will gladly furnish it.

ARTHUR H. RUDD.

Golden, Colo, June 3, 1904.

The Editor:

Sir.—In reply to the query as to breaking up sows or bottoms from black copper furnace, an effective and cheap manner of handling is as follows: With a ratchet and holding on bar, drill the bottom in sectional lines with ¾ to 1 in. holes spaced 2 or 2½ in. apart. Load with ½-in. sticks of dynamite and shoot the lines of holes to break to best advantage. Small fragments sometimes fly, and the work should be done in a safe place. A thick and heavy furnace bottom can be quickly broken up in this way very satisfactorily.

E. H. COOK.

Asientos, Mexico, June 2, 1904.

The Editor:

Sir.—In answer to C. B. N.'s question in your paper of May 26, on breaking up furnace sows, I suggest the following method used successfully by me.

Having inherited four or five large lead-iron sows very rich in silver that could not be broken up by hand, we broke them into pieces small enough to be charged into our furnaces by supporting them on the ends and letting the ball strike the middle from a ball drop such as used in rolling mills to break up large castings. These pieces we worked down with iron knobbling slag and sulphide ores, giving a hot slag high in iron and forming much matte, which when roasted we used as flux for the dry ores we were then working.

W. M. COURTIS.

Detroit, Mich., May 28, 1904.

ELECTROSCOPE FOR RADIO-ACTIVE MINERALS.

The Editor:

Sir.—I notice that in your issue of June 2 Mr. R. W. Brock describes practically the same electroscope that I exhibited and explained at the annual meeting of the Canadian Mining Institute in March last. Mr. Brock's description is, however, defective in the following points, viz.: Sealing wax is not satisfactory as an insulator, ebonite or hard rubber giving much better results, the natural fall of the leaf in my instrument being only 6° in 24 hours instead of 5° in 1 hour; then he omits the cap needed to protect the exposed loop of the wire during the experiment; this, and the defective insulation, may cause erroneous results. It is not necessary to have the gold leaf attached to a separate strip of copper; if the wire is carefully straightened and flattened slightly the gold leaf can be attached directly to it. Lastly, he omits mention of the little tray, one inch square, used to contain the powdered mineral, without which as a measure of exposed area of mineral, no comparison can be made between one sample and another. As these are important points for the investigator, I hope you will find room for these few lines.

S. DILLON-MILLS.

Toronto, June 7, 1904.

THE HENDRYX PROCESS.

The Editor:

Sir.—In an article on the Hendryx cyanide process that appeared in a recent issue there were two points that attracted attention. In the first place Mr. Fassett says "As soon as the assays show that the extraction is complete," etc. Has there been any quick method discovered or devised for the assay of cyanide solutions? If so I would like much to know of it. In my own rather limited experience the only reliable method was always one of the various evaporation methods, and in view of the comparatively large quantity of solution necessary to take as a sample from tail solutions, in order to obtain a weighable quantity of gold, any evaporation method has always involved a good deal of time.

One other point: In the Hendryx process "the charge runs to a settling tank, whence the settled pulp is sluiced to waste, and the clear solutions pumped back to storage." Here is the only weak point; and in this case since the values are not in the solution, the weakness is less than it would otherwise be. Is not the great problem in cyaniding to-day effectively to separate finely ground pulp and solution so that the pulp *can* be sluiced to waste without carrying a large quantity of solution with it? With many ores the pulp would settle so readily and rapidly that a few settling tanks would

suffice and the loss of cyanide from that carried off in the pulp would be small, but there are many others, especially those that produce a large quantity of slime, in which to settle at all with decantation of clear solution would involve a tremendous outlay in settling vats, after which the cyanide still retained by the pulp sluiced to waste would amount to a great deal. Does Mr. Fassett take this into consideration, and does he consider that this loss is more than counterbalanced by the better extraction obtained in the process?

A. R. T.

Telluride, Colorado, June 2, 1904.

GOLD IN GYPSUM.

The Editor:

Sir.—In an article entitled 'Notes on a Trip to White Oaks, New Mexico,' by Messrs. E. Percy Smith and Leon Dominian, printed in your issue of May 19, 1904, I note the reference to the occurrence of native gold in gypsum in the Old Abe mine, in veins lying between the dike of augite-porphyrite and the shales. This is noted as being of very rare occurrence, for which reason, I will permit myself, with your sanction, to add a little to the general knowledge on the subject.

In the Jesus Maria mine, San Jose de Gracia, Sinaloa, Mexico, I have often noted the same occurrence. The ledge was a fissure in decomposed andesite, which was much faulted. In the surface workings down to 100 ft. in depth, we would often run into bunches of very rich ore, in which occurred free gold in a gypsum matrix, in abundance; and this was so especially at the contact of a portion of the ledge with a fault, where there seemed to be a concentration of values. In blasting, the gypsum, being exceedingly soft, would be ground to powder, and I have picked up as high as an ounce of free gold in nuggets, ranging from the size of rice to a grain of corn, from the floor of the stope where this condition was encountered. The country rock, andesite, was badly fractured, faulted and decomposed, and the concentration of values, as described, was evidently due to secondary deposition in lime solutions; the values evidently being taken from the ledge itself, which had suffered much alteration.

In many places the country rock, to a depth of 200 ft. or more, was highly impregnated with iron pyrite, which carried gold; the rock itself giving as high as $2.50 gold per ton. This was just below the zone noted, but about the center of what we called the bonanza zone.

In the lower part of the mine, 800 ft. below the surface, the rock changed to labradorite. This was faulted, but was not decomposed, it was cut up by numerous irregular seams of gypsum, ranging from a streak to four inches in thickness, but absolutely barren. The gold bearing gypsum was always associated with the ledge and found between walls, in isolated spots, but chiefly where the end of a fragment of the faulted ledge abutted against the fault, as has been stated. There was always more or less manganese associated with the gold-bearing gypsum.

Another thing I noted, and that was, that the enriched part of the section at the fault was invariably the lower; that is to say, in going up on the ledge just before reaching the fault, the section of the ledge would often get exceedingly rich at the fault; but, at times, when the other section was encountered it would be found to be almost impoverished; although this was not always the case, especially when there was no marked enrichment of the lower section of the ledge at the contact with the fault.

At these enrichment points the ledge was always much altered, brecciated and decomposed, and re-cemented with calcium sulphate, much of which carried free gold, sometimes in nuggets. There was also much free gold in clear white quartz; but this was always highly brecciated and the altered ledge highly impregnated with iron oxide.

None of the gold bearing gypsum was ever found below 200 ft. from the surface.

E. A. H. TAYS.

Maconi, Queretaro, Mexico,
May 31, 1904.

DISCOVERY OF CARNOTITE.

The Editor:

Sir.—On account of the growing interest in the new element radium, which the ores of uranium—pitchblende and carnotite—have been found to contain, it has seemed to me that a brief narrative of the discovery, mining and marketing of carnotite might prove interesting.

In 1897 I met, in Denver, a French chemist, named Charles Poulot, who was in the market for ores containing rare metals, especially uranium ores, and through him learned to distinguish the various compounds of that element. I had long been familiar with certain deposits on Roc creek, in the extreme western part of Montrose county, Colo., that had been located many times for copper values. From Capt. S. N. King, of Utah, one of the early locators of these veins, I learned that quite a large deposit of yellow mineral, called by the owner chrome copper ore, had been exposed in one of these claims several years before. In the spring of 1898 I obtained samples of the "yellow stuff" and sent them to Mr. Poulot, who pronounced them uranium ore and gave the mineral the name of autonite or uranochre. His tests showed its oxide contents—the unit on which its worth is based—to be sufficient to make it commercially valuable. But this, the only known deposit of its kind, lay in a remote and undeveloped region, over 90 miles from a railroad.

In May, 1898, after obtaining a short term bond and lease, I started development work. During June I mined 10 tons of ore (practically all from one pocket), sacked and packed it on burros across the mesa to Paradox valley, a distance of 12 miles. From there it was shipped 80 miles by wagon to Placerville, and thence to Denver by rail, where it was sampled and sold for $2,600, or at the rate of $12.50 per unit. The entire lot averaged 21.5 per cent oxide contents. This ore also carried over 15 per cent vanadium, for which our purchasers in France, on re-sampling the shipment, exacted a penalty instead of allowing value. In order to develop a market I then had fine cabinet specimens sent to the Colorado State School of Mines and to prominent chemists and scientists. It is not improbable that it was one of these specimens which, on analysis, was found to contain radium, and was named after the eminent scientist, M. Adolph Carnot. The year after the first shipment to France, when the value of the 'yellow stuff' which we had shipped from Roc creek became known, stories were circulated which stimulated further prospecting for this mineral. I visited all reported finds, covering an area reaching from Little Castle valley in Utah at the north end of La Sal mountains, south of McIntyre cañon, through Sinbad valley, Hydraulic, Lower Miguel, La Sal creek, "Sylvia Pocket" to Snyders, above the mouth of Disappointment creek on the Dolores river—in all over 100 square miles—but found nothing to compare with the Roc creek deposit, though I became interested in a dozen claims on La Sal creek, from which we shipped ore.

The areas lying along the Dolores river and side gulches, in which the mineral is found, are of sedimentary formation, broken and cut by deep box cañons and cup-like valleys lying 1,200 to 2,500 ft. below the mesa levels. The ore occurs along rims of cañons in white or Dakota sandstone, usually over a clay bed, in disseminated grains, bedded veins, seams, occasional pockets and vugs. Near Snyders, on the Dolores river, San Miguel county, great blocks of sandstone of several tons weight that have been broken away from the 'rim' are impregnated with carnotite to the extent of probably one to two per cent. Several years ago concentration works were established near there, but the enterprise met with indifferent success.

Though these known deposits are difficult of access, reached for the most part by trails that vary from the perpendicular only enough to afford foothold for pack animals, if radium adds new value to the ore and successful concentration obtains, many prospectors will go into this field, which, with comparatively small prospecting, already proves to be quite extensive.

GORDON KIMBALL.

Curay, Colo., June 4, 1904.

A NEW USE FOR GYPSUM.

The Editor:

Sir.—After studying the gypsum industry of Germany in 1901, I called attention to the importance of 'estrick,' or flooring gypsum, in that country,[1] and the question was raised as to whether the gypsum industry of the United States admits of a similar development. Since the appearance of these articles, the fundamental principles involved in the calcining of estrick gypsum have been questioned by American manufacturers. In Germany during the same interval, on the other hand, technical literature has clearly set forth these principles. A re-statement of the facts in regard to estrick gypsum, therefore, seems timely, with a brief review of recent literature on the subject.

On visiting the gypsum mills at Mannheim on the Rhine, and at Ellrick, in the Hartz mountains, it was discovered that, in addition to calcining gypsum for plaster of paris and wall plasters at the ordinary temperature of about 280° F., they were also burning lump gypsum in open kilns at 1,000° F., which, after coarse grinding, is used for floors in place of portland cement. This phase of the industry was reported as especially profitable.

When mixed with water, preferably without admixture of sand, estrick gypsum sets very slowly, and ultimately attains a hardness but little below that of portland cement, and for many purposes is preferred to this substance. In Germany it is used as a floor material for factories, kitchens, store rooms, bathrooms and hospitals, and for these purposes competes successfully with portland cement. Details in regard to methods of manipulation for estrick

[1]This JOURNAL, Vol. 74, p. 276, and Iowa Geol. Survey, Vol. XII, p. 206.

gypsum are given in the articles referred to above.

When this matter was called to the attention of American manufacturers, it seemed wholly opposed to their experience. They have always found that gypsum, when heated to nearly 400° F. in their calcining kettles, is 'dead burned,' and wholly loses its hydraulic properties; in other words, will not 'set,' and is worthless.

The apparent discrepancy between actual German practice and American experience at this point is made clear in recent articles in *Zeitschrift für anorganische Chemie* for 1903, in which Paul Rohland calls attention to the characteristics of six modifications of calcium sulphate. These are:

1. $CaSO_4$, natural anhydrite.
2. $CaSO_4 2H_2O$, ordinary gypsum (or dihydrate).
3. $CaSO_4 \frac{1}{2}H_2O$, plaster of paris (or hemihydrate), formed by heating ordinary gypsum to 107° C. (225° F.), and slightly above.[2]
4. $CaSO_4$, the 'first artificial anhydrite,' formed by heating ordinary gypsum to 370° F., and slightly above. This is known as 'dead burned gypsum,' and lacks setting properties. Rohland insists that it results from heating only to 130° C. (266° F.).
5. $CaSO_4$, the 'second artificial anhydrite,' formed by heating ordinary gypsum to 500° C. (985° F.). This is estrick or flooring gypsum, and attains a notable hardness very slowly.
6. $CaSO_4$ Van't Hoff's anhydrite, formed from ordinary gypsum by fine grinding and heating for a long period at 100° C. (212° F.). This has hydraulic properties, and is suspected of being the same as 5, the 'second artificial anhydrite,' but its properties are not well known.

Rohland makes it plain that the various anhydrites of gypsum are allotropic, and that their properties differ as radically as do the allotropic modifications of phosphorus. The fact that gypsum, 'dead burned' at moderate temperatures will not set, therefore, does not indicate anything as to the properties of gypsum burned at 1,000° F. Experiments with American gypsum indicate that there is nothing peculiar about the German mineral, but that the American product takes on all of the properties of the German estrick gypsum if the raw material is heated to the proper temperature.

On account of the immature state of the gypsum industry in this country, and the large profit to be derived from production along lines already worked out and for products that already have an established market, it is hardly likely that the burning of estrick gypsum will be taken up at once in this country. It may be regarded as an asset, however, on which the industry will realize at some time in the future.

FRANK A. WILDER.
University of Iowa, May 19, 1904.

'Selvage' is a technical word for "the edge of a piece of cloth when so woven that it will not ravel," hence it is the edging of clay which separates a lode from its enclosing rock. It is derived from the Middle Dutch equivalent of 'self' and 'edge.' The Cornish word 'flucan' is a synonym.

[2]This is a lower temperature than has previously been given for this transformation. In ordinary practice the temperature ultimately reaches 300° F. in parts of the kettle. Doubtless, however, much of the gypsum is 'dead burned,' being converted into the 'first artificial anhydrite,' No. 4 in this series.

ON THE ASSAY OF TIN.

In referring to this matter in our last issue we credited Mr. J. H. Collins and Mr. Gilbert Pearce with the origination of a new method of tin assay. Since then we have received two reprints from the School of Mines Quarterly of Columbia University, which refer to the reduction of cassiterite by nascent hydrogen. The author is Mr. J. S. C. Wells. We publish, herewith, his account in full:

The methods for the analysis of tin-ores are so tedious and unsatisfactory that I was led, some time ago, to try and discover some simpler way of decomposing the ore, that being the chief difficulty in all the old methods.

In my first experiments, fusing the ore with borax was tried, and although this was found to effect the desired result, so far as the decomposition of the ore was concerned, still it introduced other difficulties that caused me to give it up.

The borax, at the high temperature of the fusion, attacked the platinum of the crucible to such an extent that it became necessary to separate the platinum from the tin. Boracic acid, as was to be expected, acted the same as borax. The idea then occurred to me, that the ore might possibly be reduced in the same way as the artificial oxide, *i. e.*, by means of nascent hydrogen. On trying the experiment, I found that in this way the tin contained in the ore could easily be obtained in the metallic state. My first tests were made as follows: About one gramme of the finely pulverized ore was placed in a large test-tube with a few pieces of zinc and some dilute hydrochloric acid. The first trials were made on an ore from Cornwall, and it was found to be very easily reduced. A sample of Durango ore, consisting of nearly pure cassiterite was then tried, but the reduction did not take place as readily as with the ore from Cornwall; the reduction of the latter was nearly complete at the end of an hour, whilst the former at the end of three hours showed little change. I then added a piece of platinum with the zinc and acid, and found the result to be very satisfactory, the ore being quickly reduced. Heating the test to boiling was also found to aid the reaction. The addition of the platinum also facilitates very much the subsequent solution of the reduced tin in hydrochloric acid, tin alone dissolving but slowly in the acid.

It is advisable to shake the test frequently during the reaction, so as to keep the ore in contact with the zinc and platinum. If this is not done, the ore settles to the bottom and the reduction takes place very slowly, if at all.

As soon as the decomposition of the ore appears to be complete, the remaining zinc and the reduced tin are dissolved in hydrochloric acid and filtered from any undecomposed ore or gangue. This residue should again be tested in the same way, with fresh zinc, platinum, and hydrochloric acid, to see if all the tin has been extracted by the first operation. After the tin has been obtained as chloride, it can, of course, be determined by any of the usual methods.

Instead of dissolving in hydrochloric acid, the tin might be dissolved in ferric chloride, after removal of the excess of zinc, and then determined volumetrically. The metal being in such a finely divided state would be very easily soluble in this reagent.

I find that copper and cadmium can be easily separated by the following method: To the neutral solution, containing these metals (ammonia salts must not be present) add sodium thiosulphate (hyposulphite) until the solution becomes colorless, then add sodium carbonate, and the cadmium will be precipitated as carbonate (white); filter, and to the filtrate add HCl, and boil, and the copper will be precipitated as sulphide. To use this method in the ordinary course of analysis, the solution, after removal of the bismuth, would have to be evaporated to dryness and ignited so as to remove all ammonia salts.[1]

(Here follows the second note[2] on this subject, by the same author.)

In an article on the 'Assay of Tin,' by Mr. E. H. Miller (S. of M. Quart., July, 1892), appears the following statement:

"Reduction by means of granulated zinc (Wells, S. of M. Quart., XII., 295) and hydrochloric acid was also tried, but without success, owing possibly to the omission of a piece of platinum foil, which is claimed to greatly assist in the efficiency of the reduction."

In the description of my method, I distinctly stated that some ores were only slightly acted on unless platinum was present. In order to see if Mr. Miller's failure was not due to this cause, I got from him a sample of the same ore that he used in his tests and treated it according to the method given by me, and found it to be easily reduced, yielding 64.12 per cent. of tin, a result agreeing very favorably with those obtained by him.

Further investigation of the method has shown that it is preferable to use strong hydrochloric acid instead of dilute, and in this case it is not necessary to heat, as the action of the acid on the zinc heats the solution sufficiently. A large excess of zinc should be used so as to have an abundant supply of hydrogen. The platinum I have added in the form of small pieces cut from a piece of old foil.

IN THE issue of THE ENGINEERING AND MINING JOURNAL for March 3, 1903, was published an abstract of a new method for the estimation of tungsten in steel as described in *Stahl und Eisen*. We are informed that the author of the method is E. Cooklin, chemist of the Lysswa Iron Works, Ural, Russia, and not E. Krahn, who described it, but did not claim to be the originator.

SPECIFICATIONS FOR YELLOW PINE.—The following rules for the inspection of yellow pine adopted at the recent meetings of the Georgia Interstate Saw Mill Association and the South Carolina Lumber Association are of interest to constructing engineers: All lumber must be sound, well manufactured, full to size and saw butted; free from unsound, loose and hollow knots, worm and knot holes, through shakes or round shakes that show on the surface; square edge unless otherwise specified. A 'through shake' is defined to be through, or connected from side to side, edge to edge, or side to edge. In the measurement of dressed lumber, the width and thickness before dressing must be taken; less than one inch is to be measured as one inch.

For lining steel furnaces dolomite has to be dead-roasted until all the carbonic acid and water are removed.

[1]School of Mines Quarterly, No. 4, Vol. XII, 1891.
[2]Ibid. No. 4, Vol. XIV, 1893.

THE MINERAL LAND LAWS.

BY R. W. RAYMOND.

On October 22, 1903, the President appointed a commission on the public lands, consisting of W. A. Richards, commissioner of the General Land Office; F. H. Newell, chief engineer of the United States Geological Survey, and Gifford Pinchot, chief of the Bureau of Forestry, with the following duties:

"To report upon the condition, operation and effect of the present land laws and on the use, condition, disposal and settlement of the public lands . . . and especially what changes in organization, laws, regulations and practice affecting public lands are needed, first, to effect the largest practicable disposition of the public lands to actual settlers who will build permanent homes upon them; second, to secure in permanence the fullest and most effective use of the resources of the public lands; and it will make such other reports and recommendations as its study of these questions may suggest."

This commission has already made a partial report, dealing chiefly with the Timber and Stone Act, the sale of timber on the public lands, and other forest matters. Other topics of great importance are yet to be considered. The commission is now ready to take up, as one of the weightiest among them, the intricate and difficult question of the mineral-land laws. It would, therefore, welcome co-operation and advice from all competent persons, and in particular specific criticism of existing law and practice, and the suggestion of specific remedies. While the nature of the subject is likely to delay the completion of a final report, the commission is desirous to make progress in considering it during the coming summer.

The foregoing statement embodies the substance of a communication received by me, as secretary of the American Institute of Mining Engineers, from Mr. Gifford Pinchot, a member of the Institute, chief of the United States Bureau of Forestry, and secretary of the commission to which it refers.

The rules of the Institute do not permit its official participation in such an inquiry. Papers expressing the views of individuals on the United States Mining Law, especially as directly connected with the nature and form of the mineral deposits on the public lands, have been accepted and published in the *Transactions* from time to time. But it would be physically impossible to receive, digest, publish, and discuss at Institute meetings all suggestions which might be offered with regard to the administrative details of the United States revised statutes concerning the mineral lands.

Moreover, a few only of the members of the Institute are competent to speak on this subject. Even those who are practically connected with mining in the few States and Territories concerned are not necessarily interested in this subject, or informed concerning it. For the so-called "mining law" of the United States is, strictly speaking, not a "mining law" at all, but simply a set of regulations for the sale of mineral land. As to the operations of mining on such land, the United States has made no regulations whatever. All its statutes concern the title of prospectors, possessory occupants and final purchasers of the public mineral land. Of the many millions of dollars spent in mining litigation under this law, every dollar has been spent in a dispute over the title to some piece of ground or body of ore. The mining engineer, therefore, who has to conduct the development, not to determine the ownership, of a mine, is not necessarily concerned in the so-called "United States Mining Law."

Nevertheless, a good many American mining engineers in the States and Territories afflicted with the present United States Mining Law have been forced to study its provisions and to realize their effects; and such observers and victims are earnestly requested to aid the new government commission by communicating their experiences and views. And, outside of the limits of that special profession, or of the membership of the Institute, there are doubtless many whom this article may reach—prospectors, locators, surveyors, lawyers or representatives of mine-owners—who are qualified to offer the valuable criticisms and suggestions desired by the commission. I trust that all such persons will respond to the invitation above set forth. All communications on the subject should be addressed to Mr. Gifford Pinchot, secretary of the Public Lands Commission, Bureau of Forestry, Washington, D. C.

Apart from minor questions of administrative detail, with which I have never concerned myself to such an extent as to warrant recommendations of reform on my part, I beg to suggest to the future correspondents of the commission the following topics as chief in importance:

1. First, of course, comes the burning question of the "extra-lateral right," which underlies 99.9 per cent of the mining litigation in the region subjected to this curse, from which the rest of the world has been free so long. On this point, my opinions are well known, and need not be re-stated. The fundamental objection to this abnormal and now (thank Heaven!) unique feature of the United States mineral-land law is, that it vitiates the otherwise "iron-clad potency" (to quote the United States Supreme Court) of a United States patent by inserting into that sovereign grant an eternal uncertainty as to the thing granted.

2. A close second in the competition among the evils of the present law is the system of possessory ownership and mineral-land surveys, under which a locator can acquire an indefeasible possessory title without giving any notice whatever to the United States. It follows that not a single United States land-office knows, and not a single United States map shows, what mineral lands the government still has to sell. If anybody but Uncle Sam should offer land for sale, announcing to purchasers that he did not know whether he owned it or not, but that anyone could find out by advertising at his own expense for 90 days, what should we think of him as a manager of real estate? Is there any good reason why the United States mineral lands should not be surveyed and mapped, like other lands, and why locators should not initiate their title by due notice to the owner of the land?

3. Under the same head fall the still remaining fragments of the force once accorded (perhaps necessarily) to the local customs and regulations of miners. As a sample, I will name only the recognition still accorded to a "mining district." What is a mining district? The United States statutes nowhere define it, and, so far as I now recall, only one State (Wyoming) has ever defined it. Yet I know of one place, at least, where, in spite of the legislation of a great State, directing mining locations to be recorded in the office of the county clerk, an alleged "mining district" still survived, and the "recorder" thereof still entered in an old ledger notices of mining locations which, so far as I could see, were of equal value as proof of possessory titles with those of more formal character. For the United States does not actually require any particular kind of record, and will take in evidence whatever comes along. Certainly "mining district" ought to be either authorized and defined, or else abolished.

PROVINCIAL MINING ASSOCIATION OF BRITISH COLUMBIA.

The executive committee of the Provincial Mining Association of British Columbia recently held a meeting at Nelson, West Kootenay district, to consider several matters connected with the mining industry of the Province. The most important business transacted was the passing of two resolutions, which were discussed at length during the two days' session. One of these endorsed the application of the silver-lead miners for the extension of the benefits of the Lead Bounty Act, so as to permit, for a period of one year, of the bounty being paid on lead mined in the Province and shipped abroad for smelting, the capacity of the home smelters not yet being sufficiently large to admit of all the lead ore produced in the Province being treated at home. The other involves an application to the Provincial Legislature so to amend the statutes relating to the location of placer claims as to prevent such locations being made on ground already covered by a lode mining claim; also asking that the surface rights be granted to mineral claim owners. The necessity for the amended legislation asked for has lately been made evident by the location of a placer claim over the Lucky Jack mineral claim at Poplar Creek, and the decision of the Supreme Court that the applicant for the placer claim was entitled to have his location recorded, the gold commissioner having previously given instructions not to record the same.

PROFITS OF FRENCH COAL COMPANIES.—The profit in coal mining in France seems to be exceedingly variable. A table recently prepared, showing the amount of profit per ton paid out by different French companies, shows that in the greater number of cases, it varied between 1 and 3 fr. The highest reported by any company was by the Meurschin, 7 fr., but this seems to have been altogether exceptional. The great Bruay Company reports a profit of 4.10 fr. per ton, while the Anzin, the largest coal mining company in France, reports only 2.50 fr. Several companies show profits falling below 1 fr.; thus the Ferfay Company in the Pas-de-Calais reports a profit of 0.55 fr., while the Bouches du Rhône, in the southern district, made only 0.70 fr. The general opinion seems to be that profits will diminish rather than increase, owing to the high rate of wages.

Phosphorus is an element generally undesirable in iron ore, but for the operation of the basic bessemer process it is essential that the pig iron contain not less than 1.8 per cent phosphorus. This process is in use in Europe largely, but the acid process is in more general use in the United States, though the production of basic open-hearth steel is rapidly increasing.

PYRITE SMELTING. A REVIEW.—III.

By EDWARD D. PETERS.

HEATED BLAST IN PYRITE SMELTING.

Nine of the ten tabulated replies to the question 'Is hot blast advisable?' are in the affirmative. Five of them are emphatic. The remaining four speak of hot blast as advantageous rather than essential. The tenth reply regards it as more or less advantageous, but attaches much less importance to it than do the others.

The trouble with this question is that it covers too much ground. Where there is a great abundance of iron sulphides, and a consequent ample generation of heat from their oxidation, the advantages of a hot blast are, of course, much less apparent than where there is an earthy and silicious charge, with a moderate amount of pyrite, and yet where a high degree of concentration is required. (This condition occurs most often in the dry smelting of gold and silver ores, and where even unprofitable copper is added to collect the precious metals.)

In the former case, there is an ample excess of heat to warm a cold blast of air up to the temperature of the smelting zone, and the harder one blows, the more heat there will be, for the more rapidly will the pyrite be burned; the rate of concentration being mainly controlled by the amount of silica added. In the latter case, however, the conditions are quite different. The moderate quantity of pyrite in the charge does not furnish sufficient heat for fusion; and yet the 3 or 4 per cent of coke that is being used to make up the deficiency cannot be increased, or some of the FeS will go into the matte instead of being oxidized; the ratio of concentration will suffer, and the slag will at once become too silicious from the loss of its FeO, which has gone into the matte as FeS. Thus the metallurgist is "between the devil and the deep sea." If he does not add coke, his furnace will chill for want of heat. If he does add coke, his matte will be low grade, and his furnace will chill from too silicious a slag. It is in such cases as this, where the furnace is continuously on the ragged edge of freezing-up, that the hot, or even warm, blast becomes not only advantageous, but indispensable.

Dr. Carpenter comes the nearest of any one to denying the economic advantage of hot air. He has had great experience, and every one will attach much weight to his opinion. After stating that "It reduces fuel to the extent of heat so added, but that the best hot-air stove is a very wasteful machine when heated with extraneous fuel," he adds that he "never has found the magic in mere hot air that others have professed to find." This is not easy to reconcile with his opinion expressed in Vol. X of *The Mineral Industry*, page 698, that "At Golden, Colorado, the Deadwood practice was materially improved by the addition of hot air, without which pyritic smelting should not be attempted."

Mr. Fulton says that he cannot speak from experience, but that he believes that the use of a hot blast notably increases the oxidizing effect of the smelting, and, consequently, improves the degree of concentration.

Mr. Mathewson also refers to the effect of a hot blast in improving the degree of concentration, but, in a private letter to myself, desires to limit this statement to cases where there is not a high percentage of sulphur in the charge, and where the ore column in the furnace is lowered. The wonderfully rapid smelting that Mr. Mathewson is now doing at Anaconda is of just the kind that does *not* require a hot blast, there being a large proportion of heavy sulphide ore in the charge, and the ratio of concentration being unusually low, owing to the high percentage of copper in the material smelted.

Mr. Nutting believes that "metallurgically, the hot blast is always advantageous." He doubts, however, whether it is always economically profitable where coke is comparatively cheap. Here, again, we have conditions where a hot blast is not indispensable. At the Bingham smelter, they have rather cheap coke, ample sulphide ores, and a moderate ratio of concentration.

Mr. Beardsley speaks strongly in favor of hot blast where it is necessary to make a silicious slag, and equally strongly regarding the unsatisfactory duty of U-pipe stoves. It has been found possible at Mt. Lyell to do without them at all, and, by heightening the ore column, and greatly increasing the blast, the furnaces are putting through a very large tonnage, and still oxidizing the sulphides sufficiently to maintain a fair degree of concentration. Here is a typical case of smelting a massive pyrite ore, with the addition of the least amount of silica necessary to produce a suitable slag. The charge is highly fusible, and contains an unusual proportion of heat-producing constituents.

The foregoing are the types of pyrite smelting that obtain the least advantage from the use of the heated blast.

Mr. L. S. Austin considers a hot, or even warm, blast of assistance in raw smelting, but emphasizes its value particularly in smelting a very silicious, or infusible, charge. He also refers to the difficulty so often experienced with the apparatus for heating the blast.

Mr. Bretherton speaks emphatically as to the necessity of a heated blast in pyrite smelting. I have already alluded to the conditions under which he is working, which are diametrically opposite to those of Beardsley or Nutting or Mathewson, and which, I am quite convinced from personal observation, render a heated blast indispensable to his existence at Val Verde as a successful smelter. He seems to have no difficulty with the stove of his invention, which, on my late visit to Val Verde, was consuming 2.5 cords per 24 hours of old railway ties to heat the blast for his 160-ton furnace.

Mr. Koch, of La Lustre smelter at Sta. Maria del Oro, speaks strongly in regard to the advantages of the hot blast. He says: "A warm blast of 200° C. is a *sine qua non* with us; it spelled success; cold blast meant failure." I can well understand that, in smelting the silicious ores of the Magistral vein with 7 per cent coke, and making a concentration of 15 into 1, Mr. Koch may, indeed, depend upon the heated blast. It is a typical case for its employment. Since Mr. Koch's first communication on the subject he has carried out a test* between two furnaces operating under like conditions except as to blast, and the results thoroughly confirm the opinion previously expressed by him.

Mr. Lloyd also speaks strongly in favor of heated blast.

Mr. Herbert Lang, who is credited with being the first person to demonstrate that pyrite smelting without a heated blast was possible at all, throws the weight of his experience entirely on the side of the hot blast. He says: "I believe that it invariably decreases the cost of treating the ore. . . . 1. It saves fuel. 2. It makes the furnace drive faster and smelt more in a day." He also adds: "The furnaces I have known run faster with hot blast than with cold." He speaks strongly of the defects and wastefulness of U-pipe stoves.

From the testimony on which this review is based, as well as from a number of private communications, it seems doubtful if the preheating of the blast effects any improvement in the degree of concentration when smelting a heavy sulphide charge. As this matter of concentration is a very important one, and as there is a large class of metallurgists who have as yet had no experience in this kind of smelting, and feel in doubt as to what types of ores are most benefited by pre-heating the blast, I shall take the liberty of going into the subject in some detail.

I suppose that, in the pyritic furnace, *any* degree of desulphurization can be obtained, by using ample blast, and provided there is sufficient free silica to retard the smelting operation and combine with the ferrous oxide formed by the burning of the sulphides. Theoretically, *all* of the sulphur could be burned off, and even the copper scorified and carried into the slag, if desired. Practically, such a complete oxidation as this would be very difficult to accomplish, owing to the lack of heat after the combustible portions of the charge have been consumed.

If, for experimental purposes, we should endeavor to accomplish such an unprofitable feat as this, we would find that the addition of carbonaceous fuel, beyond a certain moderate limit, would nullify the result desired, as it would simply cause the still remaining sulphides to melt down without decomposition, thus producing the very matte that we were trying to *avoid* producing, and also robbing the free silica of the ferrous oxide which is necessary for a flux. We can use a small amount of carbonaceous fuel—say 2 to 6 per cent coke—and still blow in enough air to maintain the powerfully oxidizing atmosphere that must be kept up if we are to effect the thorough scorification of each and every constituent of the charge that is capable of being scorified; but, as the slow-sinking charge approaches the zone of fusion, it becomes more and more helpless as a source of heat. There has been long-continued and powerful oxidation going on for several feet above the smelting zone, and, although all the constituents of the charge have been heated to so high a temperature that the small proportion of sulphides that still remains undecomposed is almost ready to melt, while the silica requires only a few hundred degrees more heat to fit it to combine with the ferrous oxide that will result from the burning of these remaining sulphides, we shall find that there is not quite enough heat left to complete the process. Most of the oxidizable constituents of the charge have already been oxidized, and, as soon as a substance has been oxidized, it ceases to exist as a source of heat. It is inert and dead, and absorbs, instead of producing, heat.

The furnace is in the same condition that a converter is in when we start to blow white metal up to blister copper without having an excess of heat stored up in its walls. We have no proper fuel left in the charge; the 20 per cent of sulphur combined with the copper is but a feeble source of heat, and our reliable fuel—the iron contents of the matte—has been removed in a previous operation. To prevent chilling, extraneous heat must be procured from some source or another, and, in practice, this is usually effected by add-

*This JOURNAL, May 19, 1904.

ing a quantity of lower-grade matte, the combustion of which furnishes not only the heat required to melt the white metal thoroughly, but also to warm up the converter lining to a point sufficient to carry the copper through the finishing stages of converting, where it cannot itself supply heat enough to keep the charge thoroughly melted. The converting of copper matte to blister copper without extraneous heat would be impossible, and, as has just been shown, this extraneous heat is obtained by storing up caloric in the converter walls during the stage of the process where we are generating an excess of heat, and drawing upon this source during that stage in which insufficient heat is being produced.

In pyrite smelting in the blast furnace, it is impossible to store up excess heat, to be drawn upon when needed later; we lack sufficient undecomposed sulphides in the charge to augment the heat required at the moment of fusion; and we are debarred from the use of sufficient carbonaceous fuel to supply what is wanting. The balance seems to be struck just about at the point of fusion, and the addition or the subtraction of a few thousand units of heat just at this critical moment will make the difference between successfully melting the charge, or freezing-up the furnace. It is under such conditions as these that the pre-heating of the blast, even to a very moderate degree, will turn the scale; and it is because they are dealing with (approximately) such conditions that Koch and Bretherton insist upon the heated blast, not as *advantageous*, but as *indispensable*, while those gentlemen who are smelting heavy sulphides regard it as a luxury rather than a necessity.

Bismuth, like ice, expands about 0.03 of its volume on solidification, a property which is communicated to its alloys and renders them valuable for certain purposes.

CONCENTRATION OF MESABI IRON ORES.

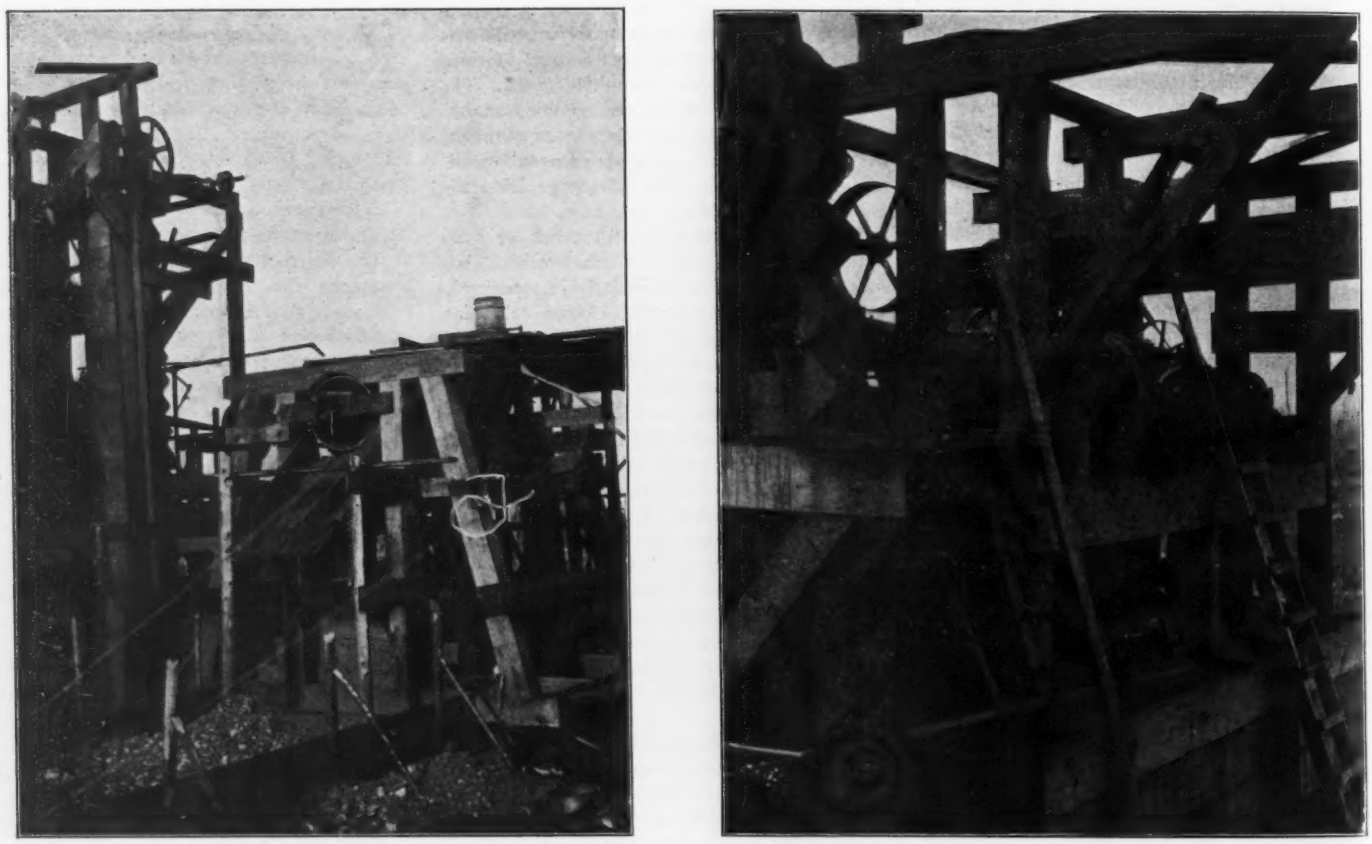
By DWIGHT E. WOODBRIDGE.

The Mesabi iron ore range, of Minnesota, was developed so recently, and the magnitude of its deposits has been so frequently mentioned in extravagant terms, that the fact of concentration being attempted there may cause some surprise. But the experiment is being made on a most important scale by men of ample means who usually succeed in what they attempt. The Canisteo Mining Company, of Duluth, is a recent organization, but its incorporators have been at work for over three years on the western part of the range that has always been considered of little value on account of the lean, sandy nature of the ores. These occur in Itasca county, extending from near the group of mines at Nashwauk, in sections 30 and 31, T. 57, R. 22, to a point several miles west of the Mississippi river, a distance of about 24 miles.

The first important experiments at concentration were made about two years ago, when Chas. Purdon, of Duluth, took ore from the Arcturus mine in section 13, T. 56, R. 24, and had it washed and screened in the South by processes commonly in use there. An option on the property was then given the Standard Mining Company, in which Mr. W. P. Snyder was chiefly interested, and experiments in concentration by washing and agitation were carried on for some time. Had the ore market remained as it was when the option was taken, it is possible that Mr. Snyder would have exercised his rights; but he did not, and the property reverted to the owners. At about that time the Union Steel Company, of Pittsburg, was, through its Donora Mining Company, at work upon the Holman 40-acre tract in section 21, same township, but after a good deal of exploration decided to abandon the place. This tract is now shown to contain 16,000,000 tons, of which 3,000,000 tons do not require concentration and is held under option by the Canisteo company. At the same time, and prior to it, the leading men of the Canisteo Mining Company were at work in the field. They explored cursorily a large area and finally settled upon that part of the ore-bearing formation crossing T. 56, R. 24, and have since concentrated efforts there. It is safe to say that at no other point in the entire Lake Superior region has so much exploration been done in the past few years, nor have such important results been attained elsewhere. The Canisteo Company and others have seen that their attempts might mean a long and costly undertaking, open only to those willing to wait for results.

It is now recognized that a Mesabi ore down to 55 per cent iron, or perhaps a little leaner, is merchantable without concentration. The ore opened in T. 56, R. 24 seems to average not far from 40 to 45 per cent, though there is a large tonnage of ore that can be sold without concentration, while much runs down to 20 or 25 per cent. It differs from much of the Mesabi ores in the fact that the silica is not combined, but occurs as free sand. The ore, which is quite hard, occurs in layers of variable thicknesses, up to several feet, while the sand lies between, sometimes as fine as flour and sometimes as coarse as sharp beach sand. The process of concentration is exceedingly simple, being a mere wet screening with various meshes, down to 30 and even 40-mesh. Drillings have shown little rock in that township. The ores lie under from 40 to about 100 ft. of surface, and the beds are of varying thicknesses up to 200 ft.

The Canisteo company and its predecessors have explored part of some 1,600 acres they hold under option or lease in this township. They have found ore enough to produce about 100,000,000 tons of concentrates, and are still hard at work. More than 200 men and numerous drills, both churn and diamond, are now



FIRST CONCENTRATING APPARATUS ON THE MESABI RANGE, AT THE ARCTURUS MINE.

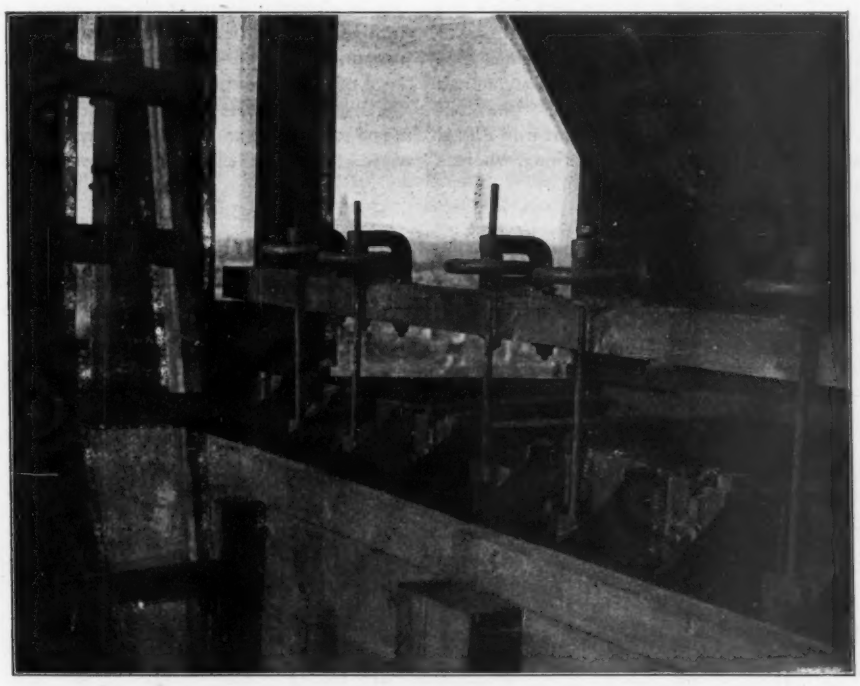
employed on their lands under the supervision of E. J. Longyear, who is doing the drilling, and of H. B. Hovland, who is in charge of the development of the mines. Two large working shafts are being sunk, one to 200 and the other to about 300 ft. Drifts will be driven in ore where variation in character is noted, and exhaustive tests in concentration will be carried out. It is believed from what work has been done that a simple tilted revolving barrel screen will be sufficient to take out sand enough to bring this lean ore up to standard. Not much water will be required, and this can be pumped from the workings. The Canisteo company intends to put in sufficient concentrating capacity in units to provide for screening the product of any mine. Methods of concentration employed at the Arcturus in the Snyder experiments will be simplified materially, as results have already shown they can be.

Of the ore found by this company about 25 per cent is sufficiently high grade to mine direct. In addition about 100,000,000 tons of raw ore have been found, and this will require, say, a 25 per cent concentration. The company has completed exploration on a few tracts, but has others on which little has been done. It has spent from $20,000 to $30,000 on individual tracts of small size and has accurate information as to a great deal of property.

Once concentrated these ores will probably be of excellent grade. They will be unusually dry, for while the average of moisture in Mesabi ores runs up to between 10 and 11 per cent, these screened ores, as shown by Arcturus tests, average 3 per cent moisture. They will be chiefly bessemer, for the elimination of sand seems to reduce the phosphorus more than proportionately. They will practically be a hard, granular crushed ore, free from dust, and it is hoped to bring them to about 60 per cent iron.

Lands on the ore-bearing formation across this township that are owned by T. B. Walker, of Minneapolis, are under the control of the Great Northern road. This road has aimed to secure an enormous tonnage along the Mesabi, and Mr. L. W. Hill, of the Great Northern, has added these lands to the road's vast holdings in other parts of the range. The United States Steel Corporation, through its Oliver Iron Mining Company, owns the old Diamond mine and a considerable acreage of additional lands in and about sections 15, 16, 21 and 22. It has an option on the Arcturus tract, and is at work there with drills. On this tract alone more than 12,000,000 tons of ore have been moved by preceding explorations, a considerable part of which can be marketed without concentration. These ownerships cover about all the favorably situated land on the sandy ore belt through this township.

In the work during the past year it has been found that the position of the ore-bearing formation differs in a minor way, chiefly as to width, from the lines laid down by the United States Geological Survey, but when the Survey's final map of the Mesabi was issued there were comparatively no data for this district, and mapping had to be done largely by surface indications, and on the Mesabi these are notoriously misleading.



JIGS AT ARCTURUS MINE.

The most westerly outcropping of the chert of the Mesabi is on the west bank of the Prairie river, in section 34, T. 56, R. 25. No considerable quantity of ore has been found west of that point, though what seems to be a wash is to be traced miles westerly, and spreads out for a width north and south of from 16 to 18 miles west of the Mississippi river. Some work has been done, enough to prove that the ore-bearing formation is not there, at least not reasonably near the surface. The largest orebody of the Canisteo Mining Company lies north of Trout lake, in sections 20, 21, 28 and 29, T. 56, R. 24. This is about three miles east from the outcropping on Prairie river, but no merchantable ores have been found in the intervening distance.

This work is the most important exploration now being carried on in the Lake Superior region, or that has been under way there for some years. It has already increased the known tonnage of the range by 150 per cent of what the Mesabi has mined throughout its entire career. It is not impossible that concentration of 40 and 45 per cent average ores at a cost of 5c. a ton, as present results seem to indicate, may be extended both ways; that still leaner ores may be brought up to merchantable grade, and that better ores, not structurally too fine, may be screened to reduce freight charges and eliminate dust. The area carrying ores similar to those now under test may be considerably extended by future work.

ESTIMATE OF CYANOGEN.—The following method for the volumetric estimation of cyanogen has been proposed by Mr. John McDowall (*Chemical News*, May 13, 1904): It is well known that the blue solution produced by the reaction of ammonia on a cupric salt when added to potassium cyanide gradually loses its color until a certain quantity has been added, when it ceases to be decolorized. On account of its intense color it seemed that the solution would make a good standard for volumetrically determining the amount of cyanogen in solutions containing chlorides. A standard solution was made by dissolving 25 grams of copper sulphate and adding distilled water to make up half a liter and then ammonia until a clear blue liquid was produced. The solution was diluted to a liter and was standardized by weighing out 0.5 gram chemically pure potassium cyanide, dissolving in 100 c.c. water and adding 5 c.c. of ammonia. The blue solution was then run in with constant stirring until the color began to disappear slowly, and then drop by drop. The finish is very sharp, one drop being sufficient to tinge the solution a light blue color. Experiments carried out with solutions containing chlorides showed that their presence does not interfere with the accuracy of the test. The method, furthermore, has the advantage over the silver method of not being influenced by light, and is much cheaper.

MOLD CAR FOR USE AT COPPER CONVERTERS.—Max J. Welch, of Chicago, has designed a new form of mold car which has been installed at the workings of the Old Dominion Copper Co. at Globe, Ariz. The gauge is the standard 36-in. The girders of the frame are 10-in. channels beams, 16 ft. long. Each girder is composed of a pair of channel beams, set face to face, with cast iron separators between them, making a box girder, so to speak. At the position of the wheels, the lower flanges of the channels are cut away, and angle bars are riveted to the backs of each channel, short split boxes being bolted directly beneath each of these angles, one box on each side of the wheel. This arrangement permits the upper half of the wheels to turn between the pair of channel beams, where it is protected from splashings while copper is being poured, as also are the boxes, journals and rails. The axles act as ties for the girders on each side, which are tied furthermore by angle bars above and below at each end.

Fully 48 per cent of the 800,432,222 gal. refined mineral oil exported by the United States in 1903 went to Europe, principally for illuminating purposes in Germany and Holland. About 25 per cent was destined to Great Britain, while the far East, chiefly Japan, China and Australia, received nearly 17 per cent. The balance was distributed among the many other countries, principally Central and South America.

THE PREPARATION OF BROWN HEMATITE IRON ORES.

BY F. LYNWOOD GARRISON.

The so-called brown hematite iron ores of the Appalachians are so intimately associated with the residual clays of the Paleozoic formation that it is usually necessary to prepare them for smelting by an elaborate system of washing. Frequently, however, this cleansing is not sufficiently thorough, with the result that much ore of this character supplied to southern furnaces averages under 50 per cent in iron.

It is obvious that a better dressing system should remove a large proportion of the accompanying clay and silica, since hand specimens or samples of these ores when carefully washed yield a much higher percentage of iron. I have recently been attempting to carry out this idea on a large scale, trying at the same time to save the fine particles of ore that are usually washed away and lost.

As to cleanliness, the results have been fairly satisfactory; but the difficulties to be overcome in saving the very fine (under 1 mm.) ore have proved a serious matter, and the problem cannot be said to be solved.

For many years it was the custom of the farmers in certain parts of Pennsylvania, where limonite or brown hematite ores abound, to wash the ore-bearing clays in a trough in which revolved a log provided with iron teeth or short arms placed at regular intervals from one end of the log to the other. The motive power was usually a horse, and the trough was always placed conveniently near a stream so that water could flow through it continuously by gravity. The trough was inclined and the log either parallel or more nearly horizontal. As the teeth in the log broke up and disintegrated the lump of clay, the lighter material flowed off at the lower end of the trough, while the heavier particles of ore were worked up the incline by the teeth and discharged at the upper end. Such, briefly, is the fundamental principle of all log washers or trommels. The origin of this device is obscure; it was probably derived from Germany by the ancestors of the Pennsylvania farmers. With the advent of large furnaces and a much greater demand for ore this simple apparatus was improved, enlarged and operated by steam power. The logs were made of octagonal section instead of round, their ends being inserted into iron cups or thimbles, which in turn were bolted to iron or steel gudgeons, as shown in Fig. 1.

In the present practice the logs are usually operated in pairs, each pair being in a separate compartment or box trough. The logs revolve in opposite directions, toward one another. Of late years numerous improvements in detail have been made in this simple apparatus and in its more complicated combinations of several pairs of logs. The McLanahan Stone Machine Company, of Hollidaysburg, Pa., deserves credit for the successful manner in which it has perfected many of these innovations. Logs or shafts constructed of steel are sometimes used when it is difficult to obtain pieces of sound oak of sufficient length and thickness. The construction of such steel shafts is shown in Fig. 2. They are usually more than 25 ft. long, whereas the wooden ones are often as much as 32. As a rule, the longer the logs the better will the ore be cleaned.

FIG. 1.

The ore-dirt or clay is best fed through grizzlies in gratings made of inverted T-rails of standard sections, the lumps too large to pass through being broken with a hand sledge-hammer. These gratings are at the lower end of the log-trough, a short distance from the discharge. The logs are sometimes placed in series, that is, the material from one or more pairs of logs passes into another set, so that the ore usually emerges from such a secondary operation as clean as it is possible to make it. The cleansed ore then passes through screens, which classify and distribute as desired.

In a plant recently designed and erected by me, the logs are arranged in series and the ore is screened to 4 mm., the coarse going to a slowly moving pan conveyor, where the larger pebbles can be picked out by hand; the fine screenings pass to jigs for the removal of the silicious sand, which constitutes most of the bulk. Up to this point the entire system of this class of ore-dressing is simple and fairly efficient. The great difficulty has been to check the enormous loss of ore washed away as fines with the mud and sand. This loss in the mud discharge probably can never be greatly checked or avoided, but the separation of the ore from the sand of the fine screenings did not seem a very difficult matter at first sight. It soon became evident, however, that it was necessary to separate two materials with specific gravities roughly approximating, being 26 for the quartz sand and 3.6 for the limonite iron ore. The problem was further complicated by the necessity of handling relatively large quantities of this mixture and by the extreme minuteness of the iron ore particles. Jigs were decided upon. In looking about for the best type the Joplin zinc practice naturally suggested itself; in that district blende with a specific gravity of 3.9 is separated from quartz of 2.6, a difference of 1.3 as compared with 1 in the case of the iron ore. What were considered the best types of machine to be found in the Joplin field were, therefore, selected, and were found in cost, lightness, and general efficiency greatly superior to any type of jig heretofore used in treating iron ores of this class. Although the Joplin jigs were crowded at times much beyond their capacity, the result as far as the 'coarse concentrates' were concerned, was excellent, better on the whole than I had reason to expect.

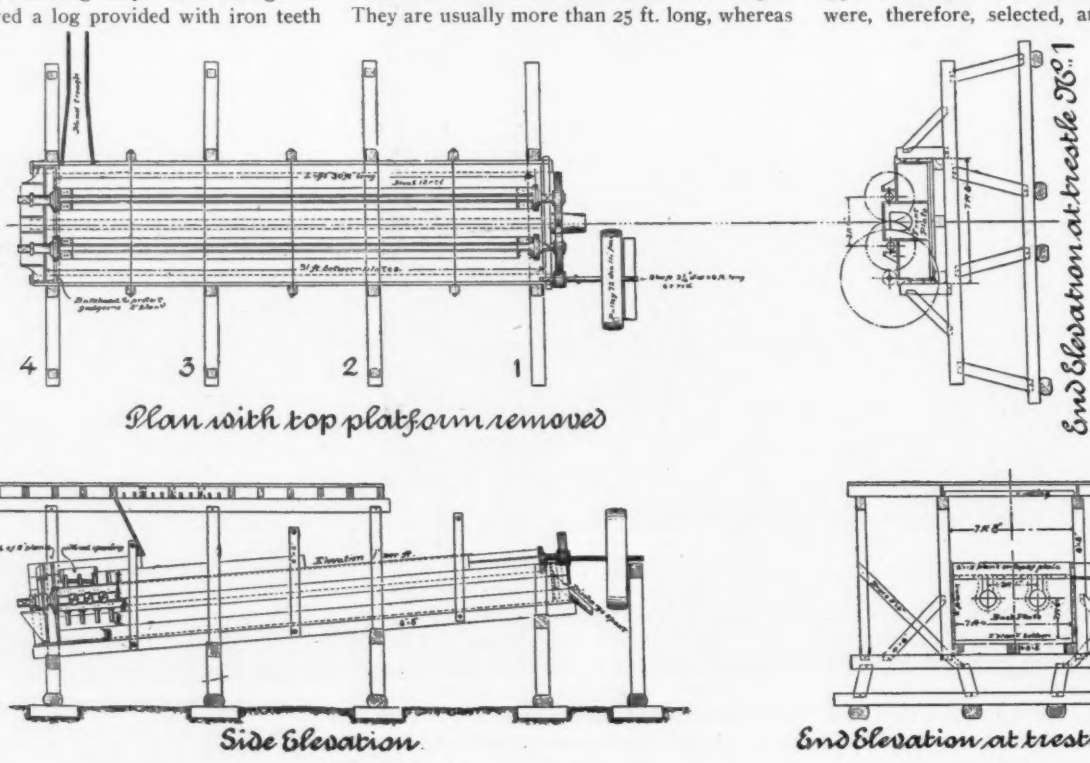


FIG. 2.

It was found impossible, however, to obtain a clean 'hutch' product. Sometimes it would be nearly pure ore, but usually half sand. Bedding with large (B. B.) lead shot was tried, but with little improvement; then smaller sizes were used with no better result. Just how to treat these hutch iron sands is the question now awaiting solution. Methods adapted to ores of the more valuable metals are probably out of

the question, since a very large quantity of material must be handled in the cheapest possible manner. Most of the iron ore washers in the southern States waste the fine ore entirely, saving nothing under ¼ to 1/6 of an inch. Such practice is obviously unscientific, but when we consider the low price of the iron ores and the great quantity of material ('ore dirt') often necessary to procure a ton of clean ore, any criticism of such wasteful methods must be moderated. In some cases 25 tons of 'ore dirt' or clay is required to yield a ton of marketable stuff; one hears of ore banks yielding 1:2 and 1:3, but they are myths; only the very best deposits will run from 1:5 to 1:12; and this is good work.

PLACER MINING IN COLOMBIA.—The gold placers of San Carlos are situated in the department of Antioquia, Colombia, about 250 leagues from the coast. According to A. Hutin (*La Revue Technique*, April 10, 1904) they form a part of the Nechi and Porce river basin, á region that was worked for gold before the Spanish conquest. Both streams have their sources in mountains of eruptive rocks from which undoubtedly the gold has been released by erosion. Some attempts have been made at dredging on the rivers, but so far they have been unsuccessful, principally owing to the fact that the channels are obstructed with timber and rocks. Mining is therefore limited to the alluvial deposits on the sides of the valley.

These deposits usually carry gold from the surface, the tenor increasing with depth. A number of tests made at different localities gave an average of from 16 to 30c. per cu. m. for the surface gravels and from $2 to $3 on bedrock. As a rule the deposits around San Carlos carry about 30 c. per cu. m. Hydraulicking is being used extensively in the district. To obtain the necessary head of water, dams are built on the main streams, sometimes of concrete, but more often of earth and rocks, and the water is conducted through open channels to the pipe-lines. At one of the representative mines the pipe-line is 2 km. long and supplies 2,000 cu. m. of water daily; with this head about 100 cu. m. of gravel can be washed down a day, which should yield about 150 grams of gold. The success of enterprises of this kind depends largely upon the degree of skill shown in obtaining the maximum efficiency from the hydraulic plant, for water in this country is synonymous with wealth. Small undertakings, therefore, labor under a decided disadvantage.

SMOKE PREVENTION IN ST. LOUIS.—St. Louis is decidedly a smoky city because of the inferior character of the bituminous coal used there, which makes complete combustion difficult. Chas. H. Jones has just reported that there are 1,132 boiler plants in the city, comprising 2,041 boilers, having an aggregate of 249,512 nominal horse power. Of the 1,132 plants, 859 use smoke preventing devices, as follows: Steam jet and air blast, 570 (66 per cent); down draft furnaces, 196 (23 per cent); fire brick arches, 37 (4.5 per cent); changed from steam to electricity, 32 (3.5 per cent); automatic stokers, 12 (1.5 per cent); smokeless fuel, 12 (1.5 per cent). There is reason for surprise in the comparatively small number of plants equipped with mechanical stokers and for the comparatively large number provided with down draught furnaces.

SOLUBILITY OF GOLD IN CERTAIN OXIDIZING AGENTS.*

By Victor Lenher.

The inactive character of gold is so pronounced that toward many of the reagents the element is quite indifferent, in fact, almost the only solvents in general use are chlorine, bromine, or a solution of alkaline cyanide in presence of atmospheric oxygen. The metallic perchlorides, perbromides and periodides, according to Nicklès, dissolve gold, the lower halides of the metal being formed along with gold chloride. Hot selenic acid readily dissolves gold. Iodic acid has slight action on the metal, while, according to Prat, a mixture of iodic and sulphuric acids dissolves gold when heated to 300°. This reaction has been verified by me; I also find that gold is readily soluble in a mixture of hot sulphuric and periodic acids. Gold is also slightly soluble in the alkaline sulphides and thiosulphates.

Several years ago I had occasion to review the work of Mitscherlich on the solubility of gold in selenic acid, and showed that gold is readily attacked by pure hot selenic acid with the formation of auric selenate. In following the same line of work with telluric acid, which in many respects is closely analogous to selenic acid. the obstacle is met that telluric acid is a solid. This apparent difficulty can be obviated by first dissolving the crystalline telluric acid in sulphuric or phosphoric acid. Such a solution of telluric acid, when heated, dissolves metallic gold. With the fact at hand that at the same temperature at which selenic acid or a solution of telluric acid attacks gold, the acids themselves are broken down into the dioxides and oxygen, it appeared probable that the solvent action in these cases was due to the production of oxygen in the reaction. The action of a large number of substances, such as oxides of various types, sulphates, etc., was tried on gold in presence of sulphuric, phosphoric and arsenic acids, and only such substances as give oxygen in presence of the acids will act on gold. In most cases, the only precaution necessary in order to demonstrate the solvent action is to have the acids in a high degree of concentration.

The first substance examined was manganese dioxide, as it is well known that manganese dioxide gives oxygen when heated with sulphuric acid. A mixture of manganese dioxide and sulphuric acid, when heated for a few minutes with gold, causes the metal to go into solution. On diluting the solution and testing with oxalic acid or ferrous sulphate, all of the gold is precipitated. In working with manganese dioxide and sulphuric acid, practically the only precaution necessary is to have the acid concentrated.

In 1872 Allen showed that when solid potassium permanganate and sulphuric acid are heated for a few minutes with precipitated gold, the solution becomes nearly clear, and on diluting and testing with oxalic acid or ferrous sulphate, the solution was found to contain abundance of gold. This experiment has been repeated, using sulphuric acid as described by Allen, and also by substituting phosphoric for the sulphuric acid. In all cases solution takes place and the gold can be readily detected by ferrous sulphate.

Lead dioxide, lead sesquioxide and red lead, when used with sulphuric acid, cause gold to enter into solution. With the higher oxides of lead, phosporic acid can be substituted for the sulphuric acid. With chromium trioxide, chromium tetroxide and nickelic oxide, solution of gold is effected in presence of sulphuric or phosphoric acids.

When nitric acid is subjected to heat, more or less decomposition is effected, part of the acid breaking down into nitrogen dioxide and oxygen. This reaction can be used in a highly satisfactory manner to demonstrate the solubility of gold in sulphuric acid in presence of an oxidizing agent. The results obtained by me show that when a mixture of hot nitric and sulphuric acids comes in contact with gold the metal enters into solution and, at the same time, a lower oxide of nitrogen is formed by the reduction of the nitric acid and this oxide remains in the solution.

The action of oxygen gas on gold leaf, suspended in hot sulphuric acid, was also tried, but neither oxygen nor ozone would cause any of the metal to pass into solution.

The anode oxygen, obtained in electrolysis, was next studied as to its action on gold. It has been shown by Spiller that when a plate of metallic gold is made the anode, and a piece of platinum foil or gauze the cathode, in an electrolyte of sulphuric acid, or a mixture of nitric and sulphuric acids, the gold anode dissolves and the metal is deposited on the cathode, the source of the current used being a few Grove cells. This work, which has been repeatedly verified, demonstrates that in the presence of strong sulphuric acid, solution of gold can be effected readily by means of anode oxygen, the action proceeding rapidly when the acid is hot. When the acid is dilute, the oxide of gold formed does not pass through the solution and deposit on the cathode as metal, but remains as an incrustation on the gold anode. Here again a similar series of results is obtained when phosphoric acid replaces sulphuric. When solutions of the acid sulphates of potassium or sodium are used as electrolytes, the action goes on exactly as above indicated. If the solution contains sufficient free acid, gold passes through the electrolyte, while if the solution is dilute or contains only a little free acid, the oxide remains as a film on the anode.

In the case of an alkaline electrolyte, such as a solution of sodium or potassium hydroxide, it is possible for some of the gold to pass through the solution, probably from the formation of aurate of the alkali. Such is actually the case, although in alkaline solution a large amount of oxide remains as an incrustation on the gold anode employed. When neutral salt solutions are employed as electrolytes, such as the nitrates or sulphates of potassium or sodium, very little, if any, of the gold can pass through the electrolyte, and as a result the anode is converted into the oxide Au_2O_3. Here we have the last step in the series of experiments, viz., obtaining the gold oxide in pure condition and retaining it as such.

In the above series of experiments the current used was from 0.3 to 0.5 ampere at a pressure of 5 volts, the anode being a sheet of gold and the cathode a 20-gram platinum crucible. In such experiments where gold was deposited on the crucible, the quickest method for removing the metallic deposit, which frequently appeared as a hard plating, was found to be the hot mixture of nitric and sulphuric acids, as indicated above. This method was found to be vastly superior to that of the use of a cyanide solution, such as was first used.

*Abstract of an article in the *Journal* of the American Chemical Society, May, 1904.

ON THE FORMATION OF CERTAIN ORE DEPOSITS.*

By F. KLOCKMANN.

It cannot escape the attention of the observant reader of the recent literature on ore deposits, that there has been an excess of genetic speculation and an overproduction of genetic systems of classification; theoretical views of narrow and radical tendency have been advanced where, in consideration of the impossibility of obtaining facts of observation of unequivocal and surely determined character, a reserved and critical attitude is far more appropriate. In the discussion of the possible methods of origin of any given ore deposit, those explanations have been intentionally chosen which not only have to do with the latest phase of its formation, but which explain this formation as the direct accompaniment, or as the after-effect of the cooling of an eruptive magma that either is actually found in its vicinity or is supposed to occur there.

Not less evident is an endeavor to prove a later bringing-in of vein material, a so-called epigenetic formation, for all ore deposits, even those that are not in the form of veins. There is a sharp contest among economic geologists on both sides of the ocean in presenting such views, although since the time of Elie de Beaumont, Daubrée, and Kjerulf new discoveries and indisputable proofs have not greatly increased. In this race the prize will fall, apparently, to the Americans, if one may base his decision upon the great number of authoritative articles and discussions in the transactions of the American Institute of Mining Engineers and in the ENGINEERING AND MINING JOURNAL. In the United States there is seen to be a leaning towards the views put forth by Daubrée and Kjerulf, and of late years most forcibly emphasized by Vogt, as a reaction against the epoch-making theories presented by Posepny at Chicago in 1893. When, however, one compares the abundant American attempts at classifications of a genetic and purely speculative nature with the paucity of actual facts, and when one sees how the inductive methods of reasoning have been reversed, then one is moved to recall the words of that meritorious and critical geologist, S. F. Emmons,[1] according to whom it is a characteristic of American investigators, in contrast to the Europeans, that they base their genetic conclusions more upon occurrences observed in the field than upon laboratory studies and theoretical reasonings.

The controversy among students of ore deposits at the present time recalls vividly that which once raged fiercely in the broader domain of general geology, to the detriment of the science, because, for long decades, it divided geologists into the two opposing factions of Neptunists and Plutonists. At the present moment the Plutonists—the old name is here also available and fits the case fairly well—have the upper hand, but it will certainly be shown that in this conflict, also, it is not the radical and too advanced generalizations that finally will prevail.

Contact metamorphic ore-deposits may be looked upon as the special domain of the Plutonists. If, occasionally, in some individual cases, there appears to be a divergence of views, as, for example, in regard to the rôle played by the physical and chemical nature of magmatic and meteoric waters, yet on one point there is complete uniformity of view; namely, that the ores occurring in contact regions have originated directly from the eruptive magma and are to be regarded as immediate differentiation products. Yet even here things are not so evident and free from doubt as has appeared, up to the present time, to the many advocates of this theory. Directly in point is the case of deposits of magnetic iron, which are the greatest in mass and the most widespread of all this class of deposits, with regard to which we have absolutely no proof that their material was derived from the immediately adjoining eruptive rocks.

Magnetic iron ores, in great accumulations and as independent deposits, may be divided, according to their manner of occurrence, into three groups:

1. Locally concentrated constituents of the eruptive rocks;

2. Normal members of the crystalline schist series; and

3. In local connection with eruptive rocks or so-called contact deposits.

As regards the origin of the ores of the first group, views are probably everywhere about the same. The magnetite is an integral part of the enclosing eruptive rock; an extremely basic differentiation product, which, under favorable chemical and physical conditions, has experienced local concentration.

Relatively to the second group, opinions and interpretations are indeed diverse. Kemp[2] enumerates not less than eight possible methods of origin without exhausting them. To the unprejudiced judge, and for typical cases, scarcely any other explanation seems admissible than the one given long ago[3] by the Swedish mining engineers and geologists (school of A. Erdman) whereby they are to be regarded as pre-existing deposits of iron ore, which, through conditions similar to those to which the surrounding crystalline schists owe their peculiar habitus, have undergone chemical transformation into the magnetic state. They owe to regional metamorphism only their degree of oxidation (Fe_3O_4), and not their substance; this was already present as siderite, hematite, or limonite.

What shall we say, then, with regard to contact-metamorphic deposits of magnetite? Although, in view of the many relations which this class has to the two previously mentioned groups, it will not always be easy, in individual cases, to assign a given ore deposit to the one or the other group[4], nevertheless among the most noteworthy advocates of this method of origin the opinion is uniformly held, that not only the chemical constituents of the deposit as magnetite, but also the derivation of its ore, is to be ascribed to contact metamorphism and to the eruptive rocks which have produced this metamorphism.

I cannot agree with this view, although it is maintained in all the newer text-books and monographs. I hold it to be entirely wrong and contradictory to other important facts in the domain of genetic mineralogy, especially to the science of contact metamorphism, and not in harmony with other repeated observations on deposits of magnetite that belong to this class. In view of the close geological and mineralogical relationship which is generally recognized to exist between magnetite deposits formed by contact and by regional metamorphism, I have long been in doubt as to the correctness of the views of those who have carried the opinions of Daubrée and Kjerulf to such an extreme that they would separate violently and assign entirely distinct positions in their systems to two types which plainly form one natural family. Observations which I have made in the course of the last few years in various localities, especially in the Sierra Morena and in Algeria, have led me to gather together an array of arguments against the prevailing theoretical views; for it is with theory rather than with positive facts that we have to deal.

In controverting the current views, it will be necessary to emphasize their essential points, and also to bring together the grounds upon which they are founded.

One of the characteristic and more important properties of these contact-metamorphic ore deposits we find often mentioned in the literature of the last few decades, notably by Vogt[5] in this journal (*Zeit. f. prakt. Geol.*) and in his English version of the same theme prepared for the Richmond meeting; likewise in the treatise presented at the same meeting by Waldemar Lindgren[6] on the 'Character and Genesis of certain Contact Deposits'; and in other essays and their appended discussions at the Richmond meeting of February, 1901, at the New Haven meeting of October, 1902, and at the Washington meetings of January and February, 1903. According to these, the magnetic iron and accompanying ores that occur within the contact zone—that is, within the zone of alterations which are brought about by the eruptive rock—have been introduced by ore-bearing solutions emanating from the eruptive rock which produced the contact phenomena. The ore deposits thus formed are consequently of epigenetic origin.

The solutions were heated. According to Vogt[7] it is of no consequence whether they

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*Translated from the *Zeitschrift für praktische Geologie*, March, 1904. 'Uber Kontaktmetamorphe Magnetitlagerstätten, ihre Bildung und systematische Stellung,' by Professor F. Klookman, of Aachen.

[1] *Transactions* Amer. Inst. of Min. Eng., Vol. xxi, 1902, p. 954, and 'Ore Deposits,' New York and London, 1903, p. 43. I would call especial attention to the last named book, edited by T. A. Rickard, which brings together the discussions of the Washington Meetings of January and February, 1903, first published in the ENGINEERING AND MINING JOURNAL, and which have been the chief cause for the above remarks. At these meetings, in which numerous well-known economic geologists took part, two warmly advocated genetic classifications, proposed by Weed and Spurr, were prominent, which, according to my mind, rest upon wholly wrong conceptions of the present status of the science of ore deposits. Regarding these two systems the words of Rickard (p. 3), to which I add no comment, may be justifiable: "The literature of that branch of geology which deals with the genesis, structure and occurrence of ore-deposits is, in its modern aspect, distinctively American, and this can be said without underestimating the inspiration given to the study of these problems by the writings of such men as Posepny, Vogt, Beck, de Launay and other European scientists." The above remarks, however, must not be interpreted as preventing my unqualified acknowledgment of the great services rendered by American investigators towards the advancement of the science of ore deposits, and my admiration of the zeal of American geologists and mining engineers who have not confined themselves to the study and description of the ore occurrences in their own country, but who also discuss, and even devote, special meetings to the consideration of the general questions which come up in connection with these investigations. In point of authoritative material on such subjects, we on this side of the ocean have nothing to compare with the annual volumes of the *'Transactions.'*

[2] J. F. Kemp: 'Ore Deposits of the United States and Canada,' 3d edition, 1900, p. 181 et seq.

[3] I will only point out here the position taken by O. Gumaelius, who nearly thirty years ago wrote, that "as a factor well recognized in Sweden, one can look upon our ore (that is, the Swedish magnetitic iron ores) and the surrounding rocks as having been formed contemporaneously." Gumaelius: Om malmlagrens aldersföljd, etc. *Svenska Vet. Akad. Förhandl*, 1875.

[4] To quote only well known instances, attention may be called to the doubtful relationship of the iron mountains of the Ural to the first or the third group, or, on the other hand, whether the magnetic beds of Schmiedeberg belong properly to group two or three.

[5] J. H. L. Vogt: Problems in the Geology of Ore Deposits. *Transactions* Amer. Inst. Min. Eng., Vol. xxxi, 1901, p. 125 et seq.

[6] Ibid. p. 226.

[7] *Zeit. f. prakt. Geol.*, 1894, p. 177.

were aqueous or gaseous. American authors[8] are more inclined to the belief in a completely gaseous state of the dissolving water, as must occur as a result of higher than the critical temperature. The water, in whichever form it occurred, either emanated directly from the adjoining eruptive rocks[9] or is to be ascribed to meteoric water[10] which reached great depths along the contact and then became charged with mineral substances from the fumaroles which emanated from the magma. The deposition of the ore comes about through a direct crystallizing-out of the ore substance—Vogt[11] speaks of 'blowing-in,' an expression which was first used by Kjerulf—or by chemico-molecular replacement of limestone; that is, through metasomatic processes.[12] This deposition generally does not take place until after the solidification of the adjoining granite, etc., but cases do occur, as in the neighborhood of Christiania, where it took place before the solidification of the magma.[13] This is plainly proved, in the latter case, by the apophyses which occasionally penetrate the deposit.

Though in more or less unimportant isolated cases the views are not yet quite clear, the newer authors, however, are all agreed upon the fundamental principle: that the ore material was originally derived from the eruptive rock and was formed contemporaneously with it.

The following are laid down as the most essential fundamental principles. It has been shown that the occurrence of magnetite ore deposits is dependent upon the occurrence and neighborhood of eruptive rocks, but not dependent, on the other hand, upon the age, the geological horizon, or the petrographical character of the enclosing country rocks. Further, the formation of various ores—especially of tinstone and its associates, among which iron materials are often found—stand in undoubted relation to eruptive rocks; and, finally, the material alteration of the country rock along the contact, which is taken as proof of the subsequent addition of the ore material. The occurrence in and near magnetite of true pneumatolytic minerals, such as fluorite, axinite, and helvite, is noteworthy, but at the same time their rarity should be remarked. It should be mentioned at this point that the rare occurrence—in the majority of cases the actual absence—of the boron and fluorine minerals, especially of tourmaline, may be used as an argument against the epigenetic formation of magnetic iron and its bringing in through the agency of contact metamorphism.

[8]Rickard: 'Ore Deposits.' A discussion.

[9] Compare Kemp in Rickard's 'Ore Deposits,' p. 47.

[10]Fuchs et De Launay, Gites minéraux,' Vol. i, p. 660.

[11] *Zeit. f. prakt. Geol.*, 1895, p. 154.

[12]B. Lotti: Descr. geol. dell Isola d'Elba, 1886. (Cited after Vogt, *Zeit. f. prakt. Geol.* 1898, p. 415.

[13] Vogt. *Zeit. f. prakt. Geol.*, 1895, p. 154.

GOLD MINING IN EGYPT.—It is reported that recent exploration of the property of the Um Rus company, which is one of the concerns that obtained concessions for gold mining in Egypt a few years since, has been of the most satisfactory nature. Two shafts have been sunk on the reef to a depth of about 500 ft. The ore carries from 8 dwt. to over 1 oz. per ton with a width of reef of from 1 ft. to 2 ft. The company will erect a stamp-mill during the present year, and it is thought that active production can begin early in 1905.

ARSENIC IN SPAIN.—According to a foreign contemporary (*L' Echo Des Mines,* May 9, 1904), a company has been formed to develop deposits of arsenical pyrite situated in the Province of Orense, Spain. The ore carries some gold and from 25 to 40 per cent arsenious acid. It is proposed to treat the pyrite by cyanidation for the recovery of the gold and the residue will then be used for the production of arsenic. A number of concessions have been granted recently in the same locality for similar undertakings.

Phonolite is from the Greek *phone,* meaning sound, and *lithos,* a stone. The fine texture of this rock causes it to give forth a ringing sound when struck by a hammer. In England it is frequently called 'clinkstone'; clink is from the Dutch, *clinken,* to ring.

CONSTRUCTION OF MINE DAMS.*

By Alexander Faulds.

Dams demand the special study of the mining engineer. Their erection does not, as a rule, offer great difficulties; but a full understanding of the matter is required to insure efficiency.

The two principal requirements are: (1) the dam must be perfectly water-tight, and (2) must be capable of resisting the water-pressure. To be perfectly water-tight, the dam must be constructed of impervious materials, and the pressure must tend to close the well-caulked joints of the structure without causing it to be deformed.

The site demands special attention, and must be chosen at a point where the rock is strong and sound. Dams are sometimes built by arching from side to side (Fig. 1), but if the place where the dam is to be built is wide in proportion to its height, the arching should be built from the bottom to the top (Fig. 2),

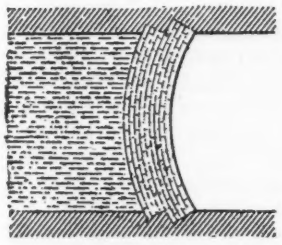


FIG. 1.—PLAN.

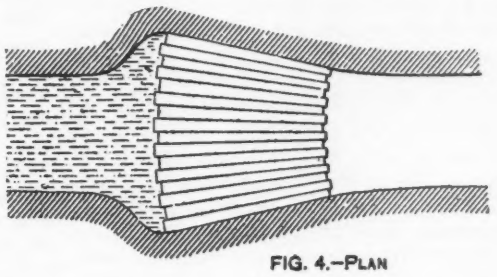


FIG. 4.—PLAN

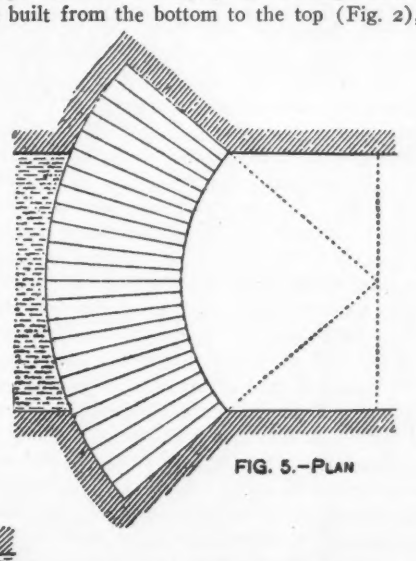


FIG. 5.—PLAN

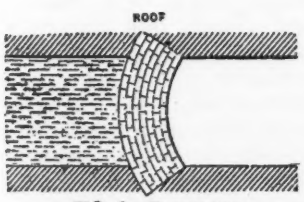


FIG. 2.—ELEVATION.

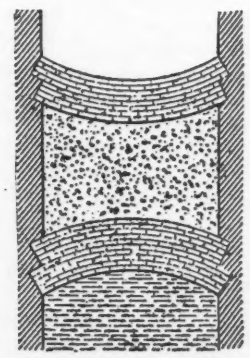


FIG. 3.—SECTION OF SHAFT.

Scale, 10 Feet to 1 Inch.

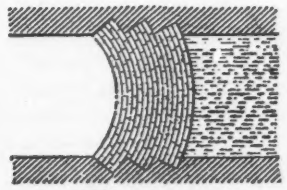


FIG. 6.—PLAN.

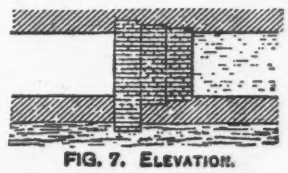


FIG. 7. ELEVATION.

CONSTRUCTION OF MINE DAMS.

and for shafts, double dams back to back (Fig. 3) are required, with concrete filling between them. The roof, floor, and sides should be carefully cut to form the faces of a pyramid or cone, having its apex or point toward the pressure. These faces are usually made about 6 ft. long. If the rock is suitable, these faces should be made true and smooth, and if rough they must be cemented.

Sometimes ordinary composition brick, well and hard-burned, is used, set with cement, mortar or concrete. The material most frequently used is timber, sound, well-seasoned oak being preferred (Fig. 4). When timber is used the pieces, from 4 to 5 ft. long, are squared and tapered according to the radius of the arch to be formed, and laid side by side in rows, the joints breaking bond, forming an arch of wooden billets or voussoirs, the lengths being proportioned to the pressure; a common length is about 5 ft. It is necessary that the voussoirs be accurately cut, in order to bear uniformly upon each other throughout their whole length. The pieces should be put to-

*Abstract from the *Queensland Government Mining Journal*, April 15, 1904, of an article from *Transactions* of the Mining Institute of Scotland, Vol. XXVI, Part I.

gether on the surface, numbered for reconstruction underground, in a thoroughly dry condition. The joints must be wedged and caulked on the side or face of the dam next to the water.

An exit for the water and men during construction is provided by a conical cast-iron pipe, large enough to allow a man to crawl through, near the bottom of the dam. A small bay, a little above the dam, is generally provided, and the water is led from it by flexible tubing through the exit pipe. When the dam is completed the exit is closed by a conical wooden plug, and covered near its larger end with vulcanized india rubber or similar material to insure a water-tight joint, and the subsequent pressure of the water will force the plug in firmly. It is sometimes desirable to arrange for the air to escape through an auger-hole bored through one of the voussoirs, a small iron tube being carried from the inside to a small cavity in the roof. When water begins to issue from the auger-hole, and all the air has escaped, the hole is plugged with wood.

To prevent the disastrous consequences caused by the yielding of dams, they should possess excessive strength, at least double the calculated thickness. When they are required to resist moderate pressures a simple structure will suffice. Masonry is sometimes used, consisting of two or more concentric arches placed several feet apart, the intervening space between them being filled with well-rammed clay; but the least yielding of the masonry abutments causes breakage, and, of course, leakage, and renders them generally unsuitable.

Professor W. S. Aldis[1] gives the following formulas for determining the minimum thickness of cylindrical and spherical dams, in which k is the minimum thickness in inches; r, the external radius in inches; T, the ultimate crushing strength of the material used in constructing the dam, in pounds per square inch; and p, the head of water in pounds per square inch.

Cylindrical dam:—

$$k=r\left(1-\sqrt{1-\frac{20p}{T}}\right).... \quad .... \quad .... \quad (1)$$

Spherical dam:

$$k=r\left(1-\sqrt[3]{1-\frac{15p}{T}}\right).... \quad .... \quad .... \quad (2)$$

In these formulas, the values of $\frac{20p}{T}$ and $\frac{15p}{T}$ must be less than unity. If they are greater than unity the material proposed to be used is not strong enough, and another must be selected. The factor of safety is taken as 10, and is allowed for in the formulas.

The following is a description of a timber-dam erected in the Extension mine, near Nanaimo, Vancouver Island, owned by the Wellington Colliery Company (Fig. 5). The construction of this dam was necessitated by a fire which occurred in the mine. Careful observations of the temperature were regularly taken, and recorded for three months, after which it was decided to flood the mine by constructing a wooden dam in the adit leading to the workings, and outside of a sealed stopping. The site selected was in the sand rock forming the floor of the coal-seam, in a gallery, 15 ft. wide by 8 ft. high. The roof, floor and sides were carefully prepared. The material for the voussoirs was Douglas pine, obtained on the island. Brattice-curtain or screen-cloth was also used, and tar. The dam was of circular form, and the voussoirs were 8 ft. long and tapered from 8 by 12 in. to 8 by 8 in. The beds of the courses, and also between the voussoirs, were laid with well-tarred brattice-cloth; and it was wedged thoroughly tight, after the voussoirs had been placed in position. A temporary clay dam was erected on the inside of the permanent dam, and the water was conducted therefrom through an exit-pipe, which was made of steel and of sufficient diameter to admit of a man crawling through. This pipe was closed with a well-stayed blind flange; and on this a gauge was fixed to indicate the pressure. The pressure was 130.2 lb. per sq. in., or a head of 300 ft. The dam was of circular form, the radius of the extrados being 20 ft., and of the intrados 12 ft., and the heights 9 ft. The thickness of the dam was 8 ft., and the formula (2) required a thickness of at least 7.92 feet.

Figs. 6 and 7 illustrate a brick dam that was built in Kehley Run Colliery, at Shenandoah, Pennsylvania, to isolate a portion of the seam, in order that it might be flooded to extinguish a mine-fire. This is one of the largest mine-dams that has ever been constructed. It is composed of three brick arches, each having a thickness of 5 ft., and placed one against the other, so that they act as one solid structure. The gallery is 20 ft. wide, and the distance to the next upper level is 119 ft. It was intended that this should be the maximum head which the dams would ever have to resist, although they were made sufficiently strong to resist a head of water reaching to the surface. The separate walls were constructed one at a time, and the cement allowed to set before the next wall was built. The back wall was carried to a greater depth and height than the others, so as to insure that all slips or partings had been closed. The total pressure upon the dam when the water was in the mine was about 486 lb. per sq. in.

When fires are flooded in face of danger, it is necessary to erect temporary stoppings so as to exclude the air and smother the fire; and thus to prevent it from spreading upward or where the water could not reach it. If the enclosure be not complete, the fire will continue to spread; if the enclosure be tight, the gases from the fires are forced through every crevice and may endanger the workmen employed at the dam. If fresh air be admitted into the enclosure to carry off the gas, it may cause an explosion by mixing the carbonic oxide gas with the proper percentage of air; consequently the operation is attended with extreme danger. In all cases the ventilating current should be arranged so that the workmen are in the intake, or fresh air, and that any gas from the fire will be carried away from the men. Care should also be taken that the return air cannot double back and mix with the intake air.

Palladium has the characteristics of platinum—it is hard, ductile, malleable and not affected by chlorine and hydrogen sulphide gases. Palladium is cheaper than platinum, and is found in quantity from a trace to one or more ounces per ton of nickel ore from the Sudbury, Ontario mines. The Orford Copper Company produces annually about 3,000 oz. palladium from 300,000 tons nickel ore, which also carries copper, silver, gold, platinum, iridium and rhodium.

[1] 'Internal Stress in Cylindrical Dams,' by W. Steadman Aldis. *Transactions* North of England Institute, 1883. Vol. XXXII, p. 201.

THE ST. EUGENE MINE.

By E. JACOBS.

This is the largest silver-lead producer in British Columbia. The mine has been idle for nearly two years owing to an adverse lead market, work being resumed on April 18. Sixty men were employed at the start, but it is intended to add 200 more shortly. Shipments of ore will be recommenced, most of the output going to the smelters in the Kootenay, the surplus above their capacity being sent to Antwerp, Belgium.

The property of the St. Eugene Consolidated Mining Company covers ten claims, comprising three adjoining groups known respectively as the St. Eugene, Moyie and Lake Shore, situated on the east side of Moyie lake, in the Fort Steele mining division of East Kootenay. The St. Eugene and Peter claims were located on June 20, 1893, the former by Rev. Father Coccola, of St. Eugene mission, near Fort Steele, and the latter by Mr. James Cronin, a mining man of many years' practical experience in the United States. Later it was ascertained that the lode on which the St. Eugene location was made dipped into the Peter, so it was mutually agreed that the locators should each hold a half interest in the two claims. Sufficient work was done in 1893 to meet the assessment requirements for two years. In 1895 vigorous prospecting led to the uncovering of a vein of silver-lead ore 8 ft to 10 ft. wide. This looked so promising that Mr. John A. Finch, of Spokane, bought out Father Coccola's interest for $12,000, thereby enabling that devoted priest to carry out the object he had in view when he yielded to the urgings of one of his Indian mission "boys" who, after discovering the outcrop, gave the reverend father no peace until the "chicamon stone" had been located, so as to provide money for the erection of a fine church.

During the next three years Messrs. Cronin and Finch expended about $80,000 in developing the property. In 1899 they sold a two-thirds interest to the Gooderham-Blackstock syndicate, of Toronto. The development and equipment of the mine was then pushed, and a further outlay of $15,000 was made. Meanwhile the Moyie and Lake Shore groups, which lay between the St. Eugene and Moyie lake, were purchased, and the St. Eugene Consolidated Mining Company was organized to acquire and operate the consolidation.

Altogether there are more than five miles of underground workings in the mine; these expose two parallel veins running east and west the whole length of the property, and from 200 to 400 ft. apart. In the main workings three cross-veins are found connecting the two main lodes; these cross-veins carry large ore-bodies ranging from 4 to 30 ft. in width. Other cross-veins have been cut in the lowest workings, which as they get deeper appear to be entering quite a network of veins.

The ore has been found in three main shoots separated by barren ground. That on the St. Eugene has been explored for a length of 400 ft. and to a depth of 500 ft.; its width is found to vary from 3 to 20 ft. While the vein dips to the south at an angle of 70°, the ore-shoot pitches east. The ore is galena, with zinc blende. The ore-shoot on the Moyle has been developed for a distance of 500 ft. and to a depth of 400 ft. It ranges in width from 2 to 16 ft.; in trend and dip it resembles the St. Eugene, but the ore-body itself pitches west.

The shoot occurring at the west end of the Moyie group and the east end of the Lake Shore has been developed to a depth of about 500 ft. and for a length of 600 ft. Like the other big ore-shoots the width varies considerably, from 2 to 30 feet.

In all three portions of the mine large lenses are found that will run 65 per cent lead and 30 to 50 oz. silver. At convenient points, where the work can be done to advantage, the ore is sorted before shipment. The remainder, together with other ore stoped, is conveyed to the concentrating mill, either directly by an aerial ropeway or by a gravity tramway supplemented by a mule tram.

The length of the self-loading aerial ropeway which connects the St. Eugene workings with the concentrator is 3,300 ft. and the difference in elevation between terminals is 1,400 ft. The stationary cable is 1¼ in. on the loaded side and 1 in. on the return, while the hauling rope is ⅞ in. diameter. Each bucket ordinarily contains 1,000 lb. The capacity of the tram is 300 tons in 10 hours. A two-bucket gravity tramway conveys the ore from the Moyie workings to the 1,500-ft. adit, where it is dumped into an incline shaft following the vein to the 1,800-ft. level, whence it is hauled in trains of 20 cars by mules along a surface tramway 2,000 ft. long to the mill.

Besides having its own concentrating mill, which is operated by water power, the St. Eugene has a steam power equipment including a 20-drill Rand air compressor driven by two 150-h. p. Babcock and Wilcox boilers capable of working at a pressure of 165 lb. per sq. in. A pipe line 1,700 ft. long conducts steam to the top of the shaft at the 1,500-ft. level to operate an 80-h. p. hoisting engine. This plant also serves as an auxiliary power to run the mill machinery whenever there is not sufficient water available to drive the Pelton wheels.

The mill building is of wood throughout. It is 250 ft. by 125 ft. and is 100 ft. high. Solid masonry walls support the several terraces on which the machinery stands on concrete foundations. The ore is crushed by four sets of Cornish rolls and a Huntington mill. The remaining equipment includes 14 Hartz jigs 10 Wilfley tables and 20 Frue vanners. The mill has a daily capacity of 400 to 500 tons. It is built alongside the Crow's Nest branch of the Canadian Pacific Railroad.

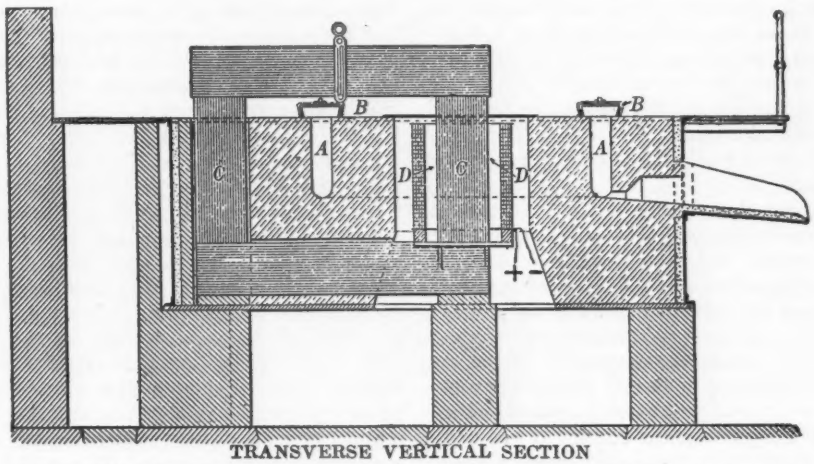
Just across the railway there is a slime-plant concentrator. At one end of this building, where the mill tail-race passes, there are four big elevators. One of these is fitted with large cups perforated with ¼-in. holes, through which the water and fine slime pass, the coarse and barren tailings being taken to the top and discharged into a flume, going thence into the lake. The water and slime drop into a tank from which three other elevators, working two at a time, lift them to the top of the building to four parallel tanks each about 150 ft. long, 4 ft. wide and 4 ft. deep, and hoppered into sections. These are for the purpose of settling the slime. The contents of each tank are drawn off in turn and the slime is fed into the machines placed on the floor below. The result of this treatment is a profitable saving of values.

The mill commenced operations in April, 1900; prior to this, shipments had been restricted to a total of between 600 and 800 tons of crude ore. During 1900, 66,507 tons of ore were milled, this quantity producing 17,201 tons of concentrates having a gross value (with lead at £18 per ton and silver 58 to 60 cents per oz.) of $1,100,994. The net amount received from the smelters was $627,415, so that nearly one-half of the gross proceeds of the ore went to pay railway and smelter charges. During the first five months of 1901 there were milled 49,159 tons of ore, which produced 12,025 tons of concentrates. While the grade of the ore was similar to that of the previous year, the market prices of silver and lead were so much lower that the gross value (with silver at 58 cents per oz. and lead at £13 to £16 per ton) was only $616,561 and the net proceeds $272,361. If the necessary calculations be made it will be found that owing to lower prices for silver and lead the gross value of the ore produced in 1901 was about $12.54 per ton, as against $16.55 in 1900, and of the concentrates $51.27, as compared with $64 for the previous year. Freight and treatment charges together averaged $27.53 per ton of concentrates shipped in 1900 and $28.62 per ton in 1901. The concentrates produced are of a character very desirable for fluxing purposes. Up to July, 1902, this product was shipped to foreign smelters, most of it going to the United States, the remainder being distributed among buyers in England, Germany and Chile.

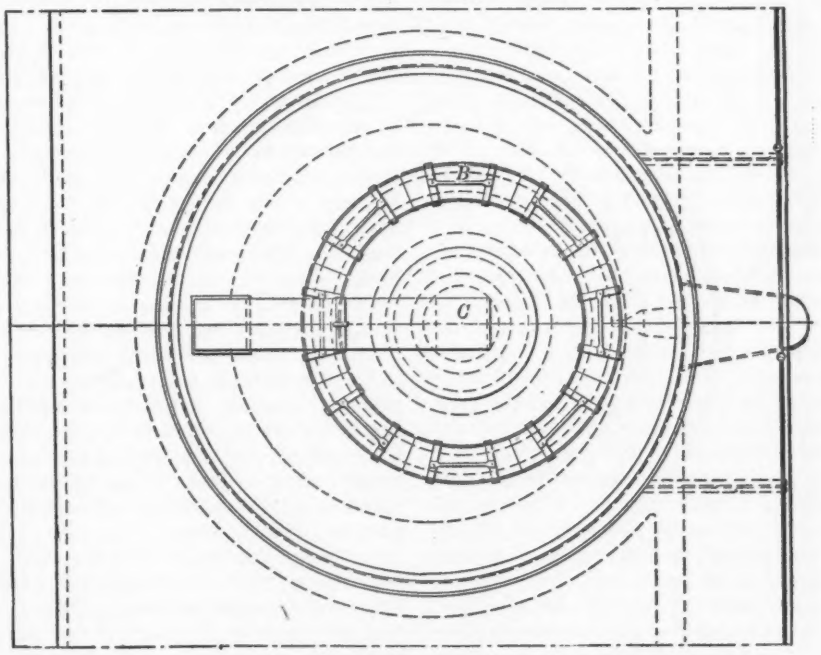
THE ELECTRIC STEEL FURNACE AT GYSINGE, SWEDEN.*

By F. A. KJELLIN.

Electric furnaces of the arc type have the inconvenience that the source of the heat—the voltaic arc—possesses a temperature of 3,700 degrees C., which is much more than that required by steel-smelting. The result of the use of this intense heat is that the steel is overheated in the vicinity of the arc, while in other parts of the furnace it has not yet reached the temperature suitable for teeming.[1] Another inconvenience is that the steel very easily takes up impurities from the electrodes consumed.



TRANSVERSE VERTICAL SECTION



PLAN

ELECTRIC STEEL FURNACE AT GYSINGE, SWEDEN.

The greatest difficulty in electric furnaces of the arc type comes from the electrodes, for the reason that carbon electrodes have high resistance, cause great losses of tension and power, and are soon consumed at the contact with molten steel. Water-cooled iron electrodes could possibly be used, but then the magnetic properties of the iron create new difficulties. In order to get sufficient intensity of current, alternating currents must be used, and then the magnetism causes the concentration of the current at the surface of the electrodes, and

*Abstract from paper read before the American Institute of Mining Engineers, October, 1903.

[1]A term used in steel metallurgy synonymous with 'pouring.'

the result is great current density in the electrodes with great losses of power, and by the influence of self-induction a diminished capacity of the electric generator to convert mechanical energy into electric energy.

In order to eliminate these difficulties I proposed to Mr. Benedicks, general manager of the Gysinge works, in May, 1899, to build an electric furnace at Gysinge, without electrodes. My project was accepted, and I went to Gysinge to carry it out.

The illustration, Fig. 1, shows the principle of the furnace. An annular groove *A A* forms the furnace-room, the sides and bottoms of which consist of refractory bricks. The covers *B B* close the furnace. In the center of the circle formed by the furnace-room is a quadrangular core or cone, *C*, formed of thin insulated copper-wire, which continues outside the furnace, and forms with the furnace-room the two links of a chain. The coil *D D* is connected with the poles of an alternating-current generator.

When passing through the coil the current excites a varying magnetic flux in the core or cone, and the intensity of current in the steel is then almost the same as the primary current multiplied by the turns of wire in the primary coil. The tension of the current is naturally reduced in almost the same ratio as the intensity is increased. In this way it is possible to use an alternating-current generator of high tension, and yet obtain a current of low voltage and great intensity in the furnace, without using transformers with copper cables of large sections and powers, and costly electrodes.

In February, 1900, the first furnace at Gysinge was ready for use, and by March 18 the first steel-ingot was cast, which was of excellent quality. The problem was then solved technically, but not economically, for, with an electric generator of 78 kw., only 270 kg. of steel were produced in 24 hours.

The next furnace built was ready in November, 1900, and produced with 58 kw. from 600 to 700 kg. of steel-ingots in 24 hours. The charges were composed of 100 kg., and the time between the teemings from 3 to 4 hours. The output was not fully satisfactory, because the cooling-surface of the walls was too great compared with the contents of the furnace, and the cost of repairs was also rather high.

On August 11, 1901, the sulphite pulp-mill of Gysinge was completely destroyed by fire, and it was resolved not to rebuild it, but to use for steel-smelting the water-power formerly absorbed by the pulp-mill.

The new plant was ready to start in May, 1902, and has since that time worked satisfactorily. It consists of a furnace holding 1,800 kg. of steel from which from 1,000 to 1,100 kg. are taken out by each teeming, and the rest left to keep the current passing. The furnace produces with 165 kw. or 225 e. h. p., 4,100 kg. of steel-ingots in 24 hours when charged with cold materials. The electric generator gives an alternating single-phase current of 3,000 volts, which is directly transformed, by means of the primary coil and iron core (cone) of the furnace, into a current of about 30,000 amperes in the steel that forms the secondary circuit.

The smelting-process, as carried on at Gysinge, where only first-class steel is produced. from Dannemora, is as follows:

After teeming, about 800 kg. of metal are left in the furnace to keep the current passing, and to this are added the proper quantities of pig-iron, bar-ends and steel-scrap as experience has proved will give the percentage of carbon desired in the resultant steel. In teeming there is always less carbon in the steel than that contained in the materials charged, for the reason that the pig-iron is rusty, and the steel also takes up a little silicon by reduction of the silicic acid of the lining. When the charge is molten and overheated to a suitable degree, the teeming is done in the same way as in the open-hearth furnace, by making a hole in the wall. The upper part of the furnace, as shown in Fig. 1, is on the same level as the working-floor, and the charging is done simply by taking off the covers and putting in the materials. As the heat is produced in the steel itself, the slag is not so hot as in other steel-furnaces, and consequently the workmen do not suffer much from the heat. The steel produced is of excellent quality, unusually homogeneous and tough, easy to work cold when annealed, and less disposed to crack and warp in hardening than other kinds of steel. I think that the cause of these excellent qualities, apart from the good raw materials used, must be due to the fact that the product contains less dissolved gaseous matter than other kinds of steel.

As every one knows, even small quantities of gases, especially hydrogen, injure the quality of steel, and the principal cause of the high quality obtained by smelting in crucibles is that the steel is not in contact with the fuel gases, though it may absorb a little through the porous walls of the crucible. In the electric furnace described above, the steel has no opportunity to take up such gases or other impurities, and the quality is even better than that of crucible-steel with the same analysis.

To make special steels with nickel, tungsten, or chromium offers no difficulties, and the alloys themselves are quite homogeneous. The cost of production depends principally on the efficiency of the furnace and the price of the power. In the furnace now in use at Gysinge the losses have been proved experimentally to be 87.5 kw., so that the effective power absorbed by the steel is 165 — 87.5 = 77.5 kw.; and, as those produce 4,100 kg. of steel in 24 hours, one effective kilowatt produces about 53 kg. of steel-ingots in the same time. Every additional kilowatt in the furnace, when the size is not altered, increases the output by 53 kg., and it is calculated within a few months, when a stronger water-wheel is obtained, to produce about 6,000 kg. of steel-ingots with 200 kilowatts.

As the absolute cost of labor and repair will be the same, those costs for one ton of steel-ingots will be about two-thirds of the present cost, and the price of power per ton also will be sensibly diminished. At Gysinge the cost of repairs (renewing the lining of the furnace when it is worn out) was $60.

From experience with this furnace it is calculated that a furnace of 736 kw., or 1,000 e. h. p., will produce 30,000 kg. of steel-ingots in 24 hours, when charged with cold materials. With hot materials the output is much greater. For instance if 250 kg. of molten pig-iron are charged for each ton of steel-ingots produced, the output is increased from 30,000 to 36,000 kg. in 24 hours, with 1,000 electric horse power.

In my opinion, the costs of labor and repairs for a furnace of this type will be less than those of an open-hearth furnace of the same size, so that, where power is cheap, there is a possibility of producing a steel competing with crucible-steel at a smelting-cost not exceeding that made in the open-hearth furnace.

QUALITY OF SAND REQUIRED FOR CEMENT MORTAR.

In specifications for the preparation of cement mortar and concrete, it is common to require that the sand shall be sharp and clean, the latter requirement referring to freedom from earth, loam and clay, generally referred to as "dirt." This specification is, however, rather ambiguous, inasmuch as it does not state what limit of dirt might be tolerated, the sand still being regarded as clean. A recent specification, quoted by the *Engineering News*, obviated this difficulty by requiring that "all sand shall be clean, sharp, fresh-water sand, of uniform texture and free from impurities; it shall show not more than 5 per cent by volume of silt after being shaken in water and allowed to subside." This specification is certainly exact, but it may be questioned if 5 per cent be not too low a limit, and if 10 per cent at least be not permissible. The effect of clay and loam in cement mortar has not been carefully studied to any great extent, but Prof. C. E. Sherman, of the Ohio State University, reported in the *Engineering News* of November 19, 1903, the result of an investigation on this subject, which goes to show that at least a moderate percentage of clay and loam is in no way harmful, but on the contrary may be even beneficial.

A series of tests was made with three kinds of sand, viz., lake and bank sand and crushed quartz. The lake sand, which was from Sandusky, Ohio, weighed 105 lb. per cu. ft. and had 40 per cent of voids; this sand all passed a 30-mesh sieve. The bank sand was from the Mock banks in Franklin county, Ohio. It weighed 102 lb. per cu. ft., had 40 per cent of voids and would pass a 12-mesh sieve. In making the tests Dyckerhoff and Lehigh cements were used, as fair representatives of imported and domestic cements. These cements were mixed with sand in the ratio of 1 to 3. The sand employed was purposely contaminated with different proportions of clay and loam. The clay employed was first dried and then ground in a ball mill to a fineness which was at least as much as that of the cement. The loam employed was common field soil, which was prepared in the same way as the clay. It was tested for hydraulic properties and found to have none.

The tests showed that mortar made of sand containing 15 per cent of clay and loam proved to be the strongest at the end of one year in eight cases out of twelve, and it was concluded that clay or loam up to 15 per cent is beneficial to cement mortar. A high percentage of loam or clay in mortar that is to be immersed is, however, a disadvantage, and if the mortar is to be placed immediately under water, more than 8 per cent would cause some trouble, as it takes longer to reach its final set. In the *Transactions* of the American Society of Mechanical Engineers, XIV, 163, E. C. Clarke reported that 10 per cent of loam used with clean sand and Rosendale cement did not decrease the strength for six months or a year, and he found that 350 briquettes of portland cement tested were not weakened by clay in moderate quantities, nor were their weathering qualities impaired in two and one-half years.

Prof. Sherman expresses the opinion that time and money are wasted in washing sand for portland cement concrete, and that the importing of lake sand, frequently specified, is often unnecessary. The insurance of a clean aggregate is of much more importance, espe-

cially if the concrete may be subjected to a tensile stress. His investigations owe their inception to a problem in connection with the construction of the Golden Gate bridge in the Yellowstone Park, where clean sand was unobtainable near the bridge site, although plenty of earthy sand was available. It was finally decided to use without washing some material containing 3 to 7 per cent by volume of alkaline earth, organic matter, etc. Upon the completion of the work, some briquettes made of cement and earth material as used showed a higher tensile strength than briquettes of the same material after washing. The Golden Gate bridge was erected in 1900 and has now well withstood for three years the extremes of climate of the Yellowstone Park, showing that the earthy material has not affected the weathering properties of the earthy cement there.

MINERAL PRODUCTION OF NEWFOUNDLAND.

The annual report of Mr. James P. Howley, head of the Geological Survey of Newfoundland, gives the production of minerals in the Island for the year 1903, with their approximate values, as follows:

		Quantity.	Value.
Gold quartz	Tons.	1,000	$3,000
Copper ore	"	87,790	343,050
Iron ore	"	588,795	588,795
Pprite	"	42,000	210,000
Barite	"	4,300	8,600
Granite	"	5,400	32,400
Limestone	"	1,200	600
Slate	"	4,200	63,000
Building stone	"	4,000	4,000
Cobble and spawls	"	4,800	2,240
Brick	M.	1,550,000	14,120
Total value			$1,269,805

The total value shows an increase over the previous year of $43,993, or 3.6 per cent.

Of the total value shown above, the material exported amounted to $1,210,365, including all the iron and copper ores, all the pyrite, slate and barite. The metallic contents of ores mined are estimated at 6,844 oz. gold, 4,411 oz. silver, 2,710 tons copper and 309,085 tons pig iron. The gold is contained partly in the gold quartz, but chiefly in the Tilt Cove and York Harbor copper ore and pyrites. The pyrite exported is estimated to be equivalent to 171,790 tons of sulphuric acid.

We give below a summary of Mr. Howley's comments on the mineral production of the Island:

The total value of the raw mineral substances used in the country, or exported therefrom, during the year 1903, amounted to $1,269,805, as against $1,217,686 in 1902, an increase of $52,119. Had the iron output reached anywhere near that of 1901 or 1902, the total result would have far eclipsed that of any previous year in the history of the country.

The shortage was due chiefly to the unsettled condition of the Dominion Steel Company's affairs. Their output fell short by 59,885 tons. The Nova Scotia Steel Company also fell off by 80,041 tons, making a total shortage for the year of 133,072 tons representing the same number of dollars.

Tilt Cove's copper ore production reached the large amount of 75,676 tons, being only exceeded by that of 1899. Terra Nova mine shipped 11,000 tons, and York Harbor mine, 1,114 tons, making in all 87,790 tons, an excess of 13,182 tons over last year, and also exceeding the total of 1899 by 833 tons.

Pyrite exhibits a substantial increase. Pilley's Island mine marketed 42,000 tons, against 26,000 the previous year, or an excess of 16,000 tons. The ore from Terra Nova mine might also be classed under this head, as it is used largely in the manufacture of sulphuric acid, but its highest value is in its iron and copper contents, and it also carries an appreciable amount of gold and silver. Nothing further was done in the way of exploiting the large deposit of pyrite at Roswell's harbor, Labrador, but the Dominion Iron Company still holds the option upon it, which it has recently been trying to dispose of to an American syndicate.

Barite from Colliers Bay mine is beginning to figure well in the mineral production, the output running up to 4,300 tons, of which 2,760 tons were sent to the Canadian and United States markets.

The manufacture of roofing slate is rapidly growing in importance, last year's production exceeding that of 1902 by 700 tons, equal to 2,100 squares, and in value by $19,000. New machinery has been installed for the more economic treatment of the slate. A small quantity of slate was also manufactured at the quarry near Hickman's harbor, Random Island, but none has been exported as yet. The slate deposits at Black Duck Cove, Random Sound and St. Jones, southwest arm of Random, have been inspected during the past year and most favorably reported on. There appears to have been a falling off in the amount of blue Signal Hill sandstone. Messrs. Reid used most of the granite in bridge construction along the line. There was no paving stone manufactured last year.

The brick industry showed a slight decrease, caused by the unfavorable weather during the early part of the season, followed later on by the burning of the plant of the Newfoundland Brick & Tile Company at Elliott's Cove.

Gold mining may be said to have fairly commenced within the year. Although the results to date are not all that was expected, still it has been demonstrated that gold exists, not only in the baser metals, but also in quartz leads, in a free state, and at least in one instance in the form of a placer deposit. The Sop Arm mine, White Bay, is the only one that has so far shown an output worth recording. Goldenville, near Ming's Bight, where the gravel and surface deposits are being treated by washing, has not turned out a success; but it is believed that much of the exceedingly fine gold of this locality is lost by the crude methods adopted in recovering it. The mine at Cinq Cerf brook is chiefly a copper proposition, the ores consisting of bornite, embedded both in the copper ores and quartz through a band of quartzite rock mixed with chloritic and talcose slate. Free gold in the form of small nuggets was occasionally found embedded both in the copper ores and quartz rock. It does not appear, however, that the precious metal is in sufficient quantity to constitute a gold mine, yet almost every specimen so far tested showed its presence, from mere traces up to values of $6 or $7 per ton. At best, in its present stage of development, it can only be classed as a low-grade ore. As yet only portions of the surface have been stripped of its overburden and a few shallow pits sunk along the outcrop, but nothing that could be considered a fair test of the property has been accomplished. More recently a large quartz vein charged with copper pyrites and zinc-blende has been discovered on the property, which has a very promising appearance.

The operations of the Newfoundland Petroleum Company at Parson's Pond have not arrived at the productive stage. Last season but one hole was put down to a depth sufficient to tap the petroliferous strata. When it reached 1,204 ft., a good flow of oil was encountered. Two other holes reached depths of about 600 ft., and though no oil was struck, the abundance of gas given off was considered evidence of oil at lower depths. None of the recently drilled holes have been torpedoed. An attempt to explode the deep hole of the preceding year, which reached 2,160 ft., failed for some reason, yet this latter was found to contain 900 ft. of oil last fall.

Nothing has been done in the way of developing the chromite deposits, but the Humber Consolidated Mining Company has commenced the construction of a tramway from the main line of railway near George's Lake to the chromite mine at Benoit Brook, a distance of about 16 miles. It is the intention to transport the ore to Humber Arm, Bay of Islands, for shipment.

The talc deposits near Manuel's and Fox Trap, Conception Bay, received considerable attention in the early part of last year, but owing to litigation, the work of development was retarded. A line for a tramway to connect the deposit at Talc mountain with the railway was surveyed.

The number of persons actually engaged in mining and quarrying was 2,067, an increase of 267 from the previous year. There were six persons killed and 11 injured; showing an average of 2.90 killed and 5.34 injured per 1,000 employed.

PETROLEUM IMPORTS INTO GERMANY.—United States Consul General Frank H. Mason reports that for three years past the imports of petroleum and naphtha products into Germany have been as follows, in gallons:

From—	1901.	1902.	1903.
U. S.	1,900,800,000	1,857,600,000	1,868,400,000
Russia	417,600,000	460,800,000	486,000,000
All other countries	115,200,000	176,400,000	396,000,000
Total	2,433,600,000	2,494,800,000	2,750,400,000

These figures include lubricating oils, in which Russia has long been ahead of all other countries. They show that the imports of petroleum products into Germany are steadily increasing. In the item of illuminating oil the United States maintains its lead, having supplied Germany with 1,077,600,000 gal. last year, against 313,800,000 gal. from Russia. Russia, however, sent 162,000,000 gal. lubricating oil, against 126,000,000 gal. from the United States.

LEAD ROOFS.—For many classes of roof, says the *Metal Industry*, lead is suitable, and in Europe it has been used for a long time. Some beautiful examples of architectural designs in lead now exist in England, but in our own country the use of lead does not seem to have made much headway. A recent writer says that in a steep pitch roof which shows conspicuously against the sky, lead is hardly suitable unless the building is lofty and monumental. When the roof is flattish and not conspicuous, lead is undoubtedly good material for the purpose. It is particularly suited for roofs of a highly decorated nature. Special devices are used to keep the lead from creeping. In order that the lead should resist the action of the atmosphere as much as possible, it is best to make the sheet from scrap, which gives a metal better suited for this purpose. Pure lead soon becomes covered with a white coating, but lead which contains a small amount of tin or antimony does not corrode as readily. Scrap lead is sure to contain considerable of these metals and so gives a better material than the pure metal.

RECENT LITERATURE ON ECONOMIC GEOLOGY.—XVII. GOLD AND SILVER.

By F. L. RANSOME.

The Circulation of Underground Aqueous Solutions and the Deposition of Lode Ores. By John W. Finch. Proceedings, Colorado Scientific Society; vol. 7, pp. 193-252, 1904.

Although concerned with the deposition of lode ores in general, this theoretical paper deals particularly with the ores of gold and silver. Starting from the premises that the principal physical agent in the deposition of ore is meteoric water, and that the essential condition of its activity is the existence of fissures in the rocks, underground water is considered divisible into three zones: Zone I is the gathering zone, called by Van Hise the 'belt of weathering,' which extends from the surface to what is commonly known as 'water level.' Zone II is the zone of discharge. It comprises that part of the belt of saturation in which the underground water has a means of horizontal escape, and is therefore subject to gravitative flowage. It is particularly developed in mountainous regions, since the underground water in such regions can escape by flowage to points of discharge at lower altitude. Zone III is the transitory or static zone. It embraces that part of the belt of saturation lying below the gradient established by points of discharge, and is characterized by the absence of flowage.

Primary ore deposits are believed to originate in Zone III under the conditions of temporary circulation induced by the unusual or catastrophic action of geological forces—particularly vulcanism. Such deposits are characteristically of low grade and only in exceptional cases workable. By far the greater part of workable lode ores, particularly such as occur as payshoots or bonanzas in otherwise relatively barren lodes, are, according to this theory of ore-deposition, found within Zone II. They are supposed to be secondary enrichments of the primary ore. The evidence for this conclusion is not given in detail. In fact, it is confessedly assumed that minerals occurring within the supposed range of Zones I and II are secondary unless they can be proved primary. Tetrahedrite and the tellurides of gold and silver (for the secondary deposition of which, by downward moving solutions, no such proof has been adduced as establishes the secondary origin of chalcocite and various silver-bearing minerals in certain carefully studied deposits) are, for example, in this paper regarded as unquestionably secondary.

The Juneau Gold Belt, Alaska. By Arthur C. Spencer. *Bulletin* 225, U. S. Geological Survey, 1904, pp. 28-42.

The rocks of the Juneau region comprise dark slates and metamorphosed limestones, crystalline schists, and intrusive dioritic rocks. The general strike of the rocks is northwest and southeast, and the dip northeast. The geological relations are very similar to those of the Mother Lode region of California, and, as in that region, mineralization followed the dioritic intrusions.

All of the important gold deposits occur in the belt of slates, greenstones and isolated dioritic masses, which lies between the coast and the main mass of diorite or granodiorite forming the Coast Range. A main lode system is recognized, consisting of a number of generally parallel, overlapping stringer-lodes of quartz. These lodes conform approximately to the strike of the schistose rocks, and are structurally similar to the Mother Lode system of California. The well-known Alaska-Treadwell mine, on Douglas island, is on the southwest edge of the belt of mineralization.

The gold in the quartz veins occurs free and in the pyrite. Other minerals found in the lodes are pyrrhotite, galena, sphalerite, chalcopyrite, magnetite, molybdenite, native arsenic, realgar and orpiment.

BOOKS RECEIVED.

In sending books for notices, publishers should, for their own sake and for that of book buyers, give the retail price. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

The Copper Handbook. Vol. IV. For the Year 1903. Compiled and published by Horace J. Stevens. Houghton, Mich. Price, $5.

The Baltimore Conflagration. Report of the Committee on Fire-Resistive Construction of the National Fire Protection Association. Chicago, Ill.; published by the National Fire Protection Association. Price, $1.

Geologic Atlas of the United States. No. CVI. Mount Stuart Folio. Washington, D. C.; engraved and printed by the Geological Survey. Five maps and 10 pages of text.

Oregon. A Story of Progress and Development, Together with an Account of the Lewis & Clarke Centennial Exposition. Compiled by Henry E. Reed, Secretary. Portland, Oregon, 1904; published for the Lewis & Clarke Centennial Exposition. Pages, 96; illustrated.

BOOKS REVIEWED.

Proceedings of the Fifteenth Annual Meeting of the Iowa Engineering Society. Published by the Society. Pages, 135; illustrated. Price, 50c.

The present publication includes the papers that were presented before the annual meeting of the Iowa Engineering Society, held at Ames, Iowa, in January, 1903. In the character and scope of its contents the volume is fully up to the standard set by its predecessors. Among the papers which are of general interest may be mentioned the following: 'Personal Observations on the System of City Water Supply and the Purification at Budapest,' by L. W. Andrews; 'Notes on Sewerage Disposal in Europe,' by Arthur J. Cox; 'Manufacture of Paving Brick in Des Moines,' by John W. Budd; 'The Des Moines River Viaduct of Mason City and Fort Dodge Railroad Company, at Fort Dodge,' by H. C. Keith; 'An Example of Concrete for Bridge Piers,' by Garrett Davis; and 'Wisdom of Planning Comprehensive Drainage Systems,' by C. G. Elliott.

Copper Handbook. Vol. IV. For the Year 1903. Compiled and published by Horace J. Stevens. Houghton, Mich. Price, $5.

This, the latest, issue of the *Copper Handbook* contains 778 pages of text, divided into 16 chapters, the first four being devoted to a summarized statement of the history, geology, mineralogy and metallurgy of the red metal. These will be found useful by investors and the general public. Then comes a glossary of the terms found in reports and prospectuses. Next follow nine chapters—from page 97 to page 157—containing a brief account of the distribution of workable deposits of copper in the various countries of the world, a chapter being given in turn to the United States, Canada, Mexico, South America, Europe, Africa, Asia and Australia.

The major portion of the *Handbook* consists of nearly 600 pages, giving details of the copper mines of the world, with particulars as to the companies operating them, their output and their prospects. It is this part of the book which renders it such a useful volume of reference. We note with pleasure that Mr. Stevens has not been beguiled by the misleading statements of several companies whose prominence is chiefly obtained through the advertisement columns of the daily press. This discrimination and the general tone of the book mark it as an honest and painstaking piece of work which we can commend to our readers. Each issue is more complete than its predecessor, and Mr. Stevens deserves the cordial thanks of the public for the publication of so useful a guide to the copper mining industry.

Geologic Atlas of the United States. Folio 94. *Brownsville - Connellsville, Pennsylvania.* Washington; engraved and published by the United States Geological Survey. Pages, 19; with maps. Price, 25 cents.

This folio covers the topography, economic geology and geologic structure of an area of 457 sq. m., including parts of Fayette, Washington, Allegheny and Westmoreland counties in southwestern Pennsylvania, the quadrangles described lying immediately north of the Masontown and Uniontown quadrangles, described in Folio 82. This area forms part of the Appalachian province, and, more particularly, covers a portion of the Allegheny plateau, the latter a region of simple geologic structure, where the strata lie nearly flat and are broken only by small faults or low broad folds. The topography is generally of the plateau type. Two rivers, the Monongahela and the Youghiogheny, cross the area, the surface of which ranges from 1,200 to 1,500 ft. above tide, except for a low uplift along what is known as the Fayette anticline, west of Scottdale. Several old peneplains are recognized, and the level tops of the hills are about 200 to 400 ft. above the valleys of the Monongahela and Youghiogheny.

The general structure of the northern part of the Appalachian coal-field is very simple, being that of a broad, flat, canoe-shaped trough, the eastern limb of which is crumpled into a number of wrinkles or folds, these being in the area under discussion in the Chestnut Ridge anticline, which crosses the southeastern corner of the Connellsville quadrangle, the Latrobe syncline, the Fayette anticline, the Lambert syncline, the Brownsville anticline, the Port Royal syncline, the Bellevernon anticline, the Pigeon creek syncline, and the Peters creek anticline. A few cross anticlines break the symmetry of the main folds. On the maps the relation of these ridges and basins is shown by contour lines drawn on the floor of the Pittsburg coal.

The rocks in the area are all of Carboniferous age, and are separated into two series; the lower, or Mississippian marine sediments, and the upper, or Pennsylvanian series, coal-bearing. The Mississippian series comes to surface only at the northwestern corner of the Connellsville quadrangle in Chestnut Ridge. It comprises the Pocono sandstone, the Mauch Chunk shales and sandstones, with some limestone. The Pennsylvania series includes the Pottsville sandstones, the Allegheny formation, the Conemaugh formation, and the Mon-

ongahela formation, and also the Dunkard, of probable Permian age. The two important coal-bearing measures are, first, the Allegheny formation, having an average thickness of about 280 ft., and usually called the lower productive measures. In this are the upper and lower Freeport coal seams, and the lower, middle and upper Kittanning. The second is the Monongahela formation, or upper productive measure, including the Pittsburg, Redstone, Sewickley, Uniontown and Waynesburg coal seams. The area described is of great industrial importance, since it produces the famous Connellsville coal. The Pittsburg is at present the only bed mined on a commercial scale. The most important of the other beds is the upper Freeport, while the Redstone is of promise locally. Almost all the coal mined around Uniontown and Latrobe is converted into coke, there being now practically 25,000 ovens in use in the Connellsville basin and the Lambert syncline. The area of coking coal has been extended to the southwest in Fayette county within the last four years, and now includes most of the Lambert syncline.

Natural gas is obtained from the Bellevernon gas-field and elsewhere, but most of the favorable territory has been thoroughly tested, and it is unlikely that any new fields will be discovered, except, possibly, some small ones upon minor folds. Other mineral resources are glass-sand and clay. They include fireclay associated with the coal-beds and residual surface clays, and are used in the manufacture of fire brick, red brick, paving brick and pottery ware.

The folio is up to the usual standard of the United States Geological Survey publications. It may be said, however, that one cannot read it without being reminded of the great work done, often with limited means, by the late J. P. Lesley—work of such high excellence that a survey, backed by the abundant aid of the National government, can merely modify minor details of the essential conclusions.

The Journal of the Iron and Steel Institute. Vol. LXIV. Edited by Bennett H. Brough, Secretary. London, 1904; E. & F. Spon, Limited. New York, Spon & Chamberlain. Pages, 819; illustrated.

The present volume is a record of the proceedings of the Iron and Steel Institute at the meeting held at Barrow-in-Furness during the first week of September, 1903. In the number and quality of the papers it contains the volume preserves the high standard that has always characterized similar publications of the Institute, while it embodies the usual store of information relating to all departments of the iron and steel industries. The limitations of space prevent us from making more than a hasty survey of its contents. Under the title of 'Alloys of Iron and Tungsten,' R. A. Hadfield contributes an exhaustive article on the properties of iron-tungsten alloys in which is combined a comprehensive digest of the literature on the subject with the results of the authors' special investigations. Among other articles on metallurgical topics may be mentioned the following: 'The Restoration of Dangerously Crystalline Steels by Heat-Treatment' and 'Sorbitic Steel Rails' under the joint authorship of J. E. Stead and Arthur W. Richards; 'The Influence of Silicon on Iron,' by Thomas Baker; 'Diseases of Steel,' by C. H. Ridsdale; 'On some further Experiments on the Diffusion of Sulphide through Steel,' by E. D. Campbell; 'Notes on the Heat-Treatment of Steel Rails high in Manganese,' by J. S. Loyd; 'The Burning and Overheating of Steel,' by A. Stansfield; 'The Regulation of the Combustion and Distribution of the Temperature in Coke-Oven Practice,' by D. A. Louis; and 'Coal as Fuel at Barrow-in-Furness,' by W. F. Pettigrew. The address of Mr. Andrew Carnegie, the president of the Institute, which is included in the volume, is a striking presentation of facts relating to the recent progress and present status of the steel industry, but as it has already been widely quoted in the press no details are needed at this time.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

A Warning.

Sir.—A young man who calls himself Dr. Theodore Kent and purports to come from the Lake Superior Power Company, Sault Ste. Marie, Mich., called on myself and upon other engineers in the city of Buffalo, and through the tale of woe which he had to tell was able to secure several moderate sums of money.

He is a young man about 35 years of age, about 5 ft. 9 in. tall, with large prominent eyes, and wears a mustache. This man is a thorough fraud, and I wish you would make some notice of it in your JOURNAL so as to protect other professional men from being gulled as we were in Buffalo.

ENGINEER.

Buffalo, June 1, 1904.

Coal in the Far East.

Sir.—I do not think that any one has called attention to the complications which the present war is causing in the coal supply of the Far East; at least I have seen little or nothing about it. These complications affect chiefly the carrying trade. The countries of the Far East are not large consumers of coal themselves, except in Japan, the greater part of the supply being used by steamships navigating the Pacific, the Indian Ocean and the China Sea. Australian coal has been the backbone of the Eastern trade, the Newcastle coal from New South Wales being considered the best steam coal procurable locally. The supply, however, is not sufficient for the demand, especially since the Newcastle output has been restricted by labor-unionism in an aggressive form. The Japanese coal, especially that from Hokkaido, comes next, but its export is practically stopped, and probably all of it will be required for naval use, while the war lasts. Most other eastern coal—as that from Ombilien, Java, from Borneo, from Hongay, in French Indo-China, and from other scattered mines—is chiefly lignite, and too friable in its nature to stand much handling, or transfer to steam vessels. The Hongay coal, however, makes good briquettes. The Russians have had a good deal to say about coal in the Ussuri district in Siberia. There is some good coal there, but mining has been carried on by Russian bureaucratic methods, with the result that the quantity mined is not sufficient for the needs of the Russian navy. The Chinese coal measures are so little developed as yet, that no reliance can be placed on any supply from that source. There is a shortage of coal in nearly all the large ports in the Far East, and good coal is much wanted.

Unfortunately, the United States is not in a position to take advantage of the situation. There is no coal on the Pacific Coast which can be spared for export. To send coal from Atlantic ports involves a long delay, especially as heavy shipments must go by sailing vessels, steamer rates being too high. If some cargoes could be sent, say of Pocahontas or New River, or of Clearfield, they would command a high price at once. I am afraid the voyage is rather too long.

It is generally acknowledged that coal is contraband-of-war, and liable to seizure, even if in a neutral vessel. So caution is needed, as both parties are willing to stretch a point to decide that coal found in a merchant ship is intended for the enemy.

Here, in Manila, we have had a good deal of Japanese coal, which is now cut off for the time being. Australian coal is scarce and high priced. It is a good chance to develop the use of our own coal, from Cebu and elsewhere; but no one seems ready to take advantage of it. I am convinced that there is coal to be had of better quality than the little already mined in the Islands. The development of such a supply ought to be profitable, since, even should the war soon come to an end, there is demand for more coal in the East; and very little promise of increased supply. There is certainly a good opportunity here.

FILIPINO.

Manila, P. I., April 30, 1904.

ABSTRACTS OF OFFICIAL REPORTS.

Sulphide Corporation, Ltd.

This company operates smelting works at Cockle creek, and also works the Central mine in the Broken Hill district in New South Wales. Its report is for the year ending June 30, 1903.

The general manager's report shows that at the Central mine 213,330 tons of ore were raised and 212,885 tons treated in the concentrating plant. The report says: "In the mill a favorable recovery of silver and lead was maintained; the classification produced by milling was as follows:

Products.	Tonnage.	Proportion.	Assay Value. Ag. oz.	Pb. %	Zn. %
Concentrates.	42,199	19.8	29.5	61.0	10.5
Middlings ...	4,243	2.0	9.2	7.5	26.0
Slimes	18,122	8.5	15.5	18.3	21.8
Tailings	148,321	69.7	6.6	5.6	20.7
Total	212,885	100.0	12.0	17.7	18.9

"Various improvements and modifications have been made in the detail working of the plant, which have assisted materially to maintain the grade of the concentrates. The by-products in stock have increased to 798,256 tons, of which 680,437 tons are tailings assaying 6.5 oz. Ag., 5.0 per cent Pb., and 22.1 per cent Zn., and 117,819 tons are middlings at present under treatment; there are also available for future treatment 77,895 tons of slimes assaying 14.7 oz. Ag., 17.8 per cent Pb., and 23.4 per cent Zn. The magnetic plant, comprising various magnetic machines, supplied by the Electro-Magnetic Company (system Mechernich), has treated a total of 27,376 tons of middlings, producing 13,389 tons of zinc concentrates of good average grade. During the

first half of the year several additions were made to the mill for the purpose of reducing, handling and increasing its capacity. A large drier was also installed, as it was found desirable that the raw material should be regularly kept to one standard of dryness. The capacity of the plant has, in consequence of this and other improvements, been more than doubled, and the working costs considerably reduced. While this treatment of the by-products has been under successful operation, numerous preliminary tests have been made by the Electro-Magnetic Company's improved machines, and other more recent processes which have come forward during the past twelve months, promising in the early future a further large extension of the profitable utilization of the reserves of tailings, etc., and are, moreover, expected to be applicable to the direct treatment of the crude ore; but the matter involves so large and important an investigation that careful and extensive experiments are required before any definite recommendation can be made.

"At Cockle creek, smelting operations have been conducted on a greatly increased scale, 55,776 tons of concentrates, purchased ore, etc., having been passed through the smelters, as against 40,279 tons during the previous year. The increased tonnage has favorably affected costs, which will be still further improved when the progressive series of improvements and additions for adapting the plant to its special conditions is completed. The input to the smelters consisted of: Concentrates, 28,872 tons; slimes, residues, etc., 6,448; purchased ore, 20,456; total, 55,776 tons. From the above, 16,698 tons of bullion were produced, containing 69,360 oz. gold and 1,219,879 oz. silver; or 478 tons of bullion, 33,447 oz. gold and 79,853 oz. silver in excess of the previous year's production. The residue of lead concentrates produced at the mine was sold locally and to European buyers.

"The roasters have been modified to the requirements of the Huntington-Heberlein process; two additional large mechanical furnaces, giving increased capacity with reduced labor and fuel costs, have been added.

"During the year 1,468 tons of zinc concentrates, etc., from the mine were treated, from which 256 tons of spelter of excellent quality were produced. The initial difficulties inherent to the establishment of a new industry are gradually being overcome, and the work-people are now more readily trained to the special work required of them. One furnace, or about one-fourth of the full capacity of the plant. has been kept in full work. The recovery of silver and lead in the residues has been good; zinc recovery, however, has continued low, which is partially accounted for by losses in roasting, one of the old roasters having been utilized for this purpose. On extending operations to the full capacity of the plant, special roasters will be constructed, thereby further reducing considerably zinc losses."

The directors' report says: "The gross profit amounts to £40,935, and after charging £11,000 for depreciation (this is exclusive of over £9,000 debited in working account for the amortization of special plants), and £5,000 for interest on debentures, there remains a net profit of £24,935, which, with the amount carried forward from last year, £96,921, leaves a total sum of £121,856 to the credit of profit and loss account. From this sum, the directors recommend that a dividend of 5 per cent should be paid on the preference shares, and that the balance of £94,356 should be carried forward.

"The prices for lead and silver have again been on a low level during the year under review, and profits have in consequence continued to be unfavorably affected. In addition to adverse metal markets, the corporation has suffered during the year from the effect of movements which occurred in the underground workings of the Central mine at Broken Hill. From this cause, and from the infiltration of water from a neighboring mine, the output of leady concentrates has been reduced, and the cost of production has been increased. Taking all these circumstances into account, it is satisfactory to find that the balance of profit on the year's working shows a decided improvement on the figures of the previous year.

"At the Central mine, expenditure on development work, though interfered with by the creep, has been maintained as far as possible on the usual lines with a satisfactory increase of the ore-reserves. During the year the average weekly output of ore raised and milled was 4,083 tons, against 4,822 tons and 4,217 tons in the two preceding years, and the average weekly yield of concentrates, 811 tons, against 985 tons and 914 tons. The average cost per ton of ore for mining and milling has been 15s. 5d., against 14s. 3d. and 14s. 10.5d., and the cost per ton of leady concentrates has been £4 2s. 7.5d., against £3 14s. 8d. and £3 16s. 8d. The lower tonnage of ore treated and the abnormal increase in the cost of concentrates are the result of the underground movements and the infiltration of water above referred to. The cost of mining alone was increased by over £7,000 during the year, and the reduced output, owing to the general expenses having to be distributed over a smaller tonnage, further materially increased the cost of concentration. The necessity for a new hauling shaft was referred to in the last annual report, and the work in connection with it is being pushed on with all speed. According to the latest reports, it is now down 215 ft., and drives are being taken in hand to connect with the 400, 500 and 600-ft. levels. The drought at Broken Hill, which seriously affected operations in July and August last, has now ended, and the supply of water in the Stephen's creek reservoir entirely removes all cause for anxiety.

"On the recommendation of Mr. Courtney, who reported that, practically, the whole of the dumping space at the disposal of the company was occupied, the acquisition of the North Central lease of 40 acres, adjoining the Central mine lease, was decided upon, and completed in January last, at a cost of £2,500, the lease being for 20 years from January 1, 1906. Operations at the Central mine are very much facilitated in consequence.

"The reference to the Arbitration Court on the part of the Broken Hill miners caused considerable uneasiness among Broken Hill companies, but the decision in the case has now been given, and the result briefly is, that the position in regard to the rates of wages at Broken Hill remains practically unchanged.

"At Cockle creek, 28,872 tons of leady concentrates, 20,456 tons of purchased ores, and 6,448 tons of slimes, residues, etc., have been smelted, from which were produced 16,698 tons of lead bullion, containing 69,360 oz. gold and 1,219,879 oz. silver. The large output of gold is due to the gold contents of ores purchased, chiefly from West Australian mines. The balance of the leady concentrates produced was sold locally and to European buyers, 13,840 tons having been disposed of in this manner. The result of operations at Cockle creek shows material improvement. The supplies of purchased ores have largely increased, and there has been a satisfactory diminution in costs to set against the higher costs incurred at Broken Hill. The rates at which concentrates have been sold to European buyers have also been more favorable than in the preceding year.

"Zinc distillation has been continued with one furnace, and 256 tons of spelter of excellent quality have been produced. It is hoped that a bonus on spelter made in Australia, which has been recommended by the Commonwealth government, will assist in the establishment of this industry on a satisfactory footing."

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Potassium Nitrate.—Will you kindly inform me regarding the industry of producing and selling KNO_3?—D. B. C.

Answer.—The consumption of saltpeter, niter or potassium nitrate is satisfied principally by India, where the mineral occurs as a natural efflorescence on the surface of the ground. The more important mines are situated in the district of Behar, province of Bengal, and it is estimated that India as a whole has 232,314 square miles of mineral-bearing ground. The custom in that country is to refine the crude saltpeter by solution in water; filter so as to separate the clean liquor, and evaporate to the point where crystallization will take place upon cooling, the foreign salts (chiefly sodium sulphate) being removed by preciptation while boiling. Subsequently the pure crystals are washed with water or alum water, drained and dried, and are then ready for market. The imports into the United States in 1903 amounted to 13,835,668 lb., which was nearly all consumed locally, principally in the manufacture of gunpowder, and as a manure in agriculture. At present crude saltpeter sells in New York at $3.45@$3.50 per 100 lb., and refined at $4@$4.50. So-called artificial saltpeter is being made at Niagara Falls, New York, by an electrolytic process from a mixture of nitrate of soda and chloride of potash.

Pneumatic Ore Separators.—Can you put us into communication with the manufacturers of a pneumatic separator which will successfully separate hornblende and silica from phosphate of lime?—APATITE.

Answer.—We know of no pneumatic concentrator that is, on a commercial scale, making the separation you mention. We shall be glad to hear from manufacturers.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

DUTY ON ZINC PIGMENT.—White paint containing 59.23 per cent of zinc oxide and no lead is not dutiable as white paint containing lead, under paragraph 55, tariff act of 1897. It seems that such merchandise is dutiable under paragraph 57 of said act, which provides for "white paint or pigment containing zinc, but not containing lead, dry, 1c. per pound; ground in oil, 1.75c. per pound." Appeal of Perry, Ryer & Co. from Collector of Customs at New York; Board of General Appraisers.

PROPER REGULATIONS ARE NOT DISCRIMINATION AGAINST COAL SHIPPERS.—A carrier which transports large quantities of coal is entitled to make regulations with respect to the manner of receiving and transporting it, so that it may be handled expeditiously, safely and economically, without unnecessary interference with the other business of the carrier; and regulations which are well designed to promote such object cannot be complained of, on the ground that they operate to give a preference to one who complies with them, or as a discrimination against one who does not.—Harp v. Choctaw, Oklahoma & Gulf Railroad Company (125 *Federal Reporter,* 445); United States Circuit Court of Appeals, Arkansas.

RESERVATION IN DEED OF COAL LANDS STRICTLY CONSTRUED.—A deed to certain land provided that the parties of the first part "hereby expressly reserve to themselves forever the use and occupancy of any one of the coal banks on said land that they may at any time hereafter, or that either of them, or their heirs or assigns, may jointly or severally select, together with the right of way for ingress and egress." There were six separate coal veins underlying the land. The heirs of the grantors designated one of such coal veins, claiming it under the exception or reservation. The court held that the reservation, if good for any purpose, reserved only the right to take coal, for the purpose for which it was then used in that section, from any of the coal veins on said tract, to be selected by the persons mentioned in the deed, and that the occupancy of any of the banks must be restricted to the purpose of digging and removing coal for such purposes, so that there was no reservation of title supporting an action of ejectment for such coal.—Chapman v. Mill Creek Coal & Coke Company (46 *Southeastern Reporter,* 262); Supreme Court of West Virginia.

WHEN STATE LAWS WILL NOT BE CONSIDERED: ADVERSE CLAIMS.—In an action to determine the right of possession of a lode and mining claim, arising out of proceedings had in the land office of the United States, State laws regulating generally actions for the recovery of real property, or questioning the title to same, have no application, in view of the provisions of the laws of the United States (U. S. Comp. Stat., p. 1430) relating to mining and providing for the filing of adverse claims. Where no claim adverse to a mining claim sought to be patented under the mining laws of the United States (p. 1429) is filed in the time limited, it will be conclusively presumed that the applicant is entitled to a patent, and that no adverse claim exists.—Lily Mining Co. v. Kellogg (74 *Pacific Reporter,* 518), Supreme Court of Utah.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending June 8, 1904.

761,646. ORE-TREATING FURNACE.—Aron M. Beam, Denver, Colo. In an ore-treating furnace, the combination of three concentric cylinders, combustion and smoke chambers operatively connected with the opposite ends of two of said cylinders, means for feeding ore into, conveying through, and discharging out of the middle of said cylinders, suitable means for connecting the cylinders, means for supporting them, and suitable means for rotating them, substantially as described.

761,658. METHOD OF CONSTRUCTING TUNNELS.—Amasa B. Clark, New York, N. Y. A method of constructing tunnels which consists in advancing through soft ground a lining, passing a plurality of piles, from within the lining into the surrounding material and securing the inner ends of said plurality of piles to the lining so as to resist tensile, compressive and shearing strains, substantially as described.

761,674. DUMP-CAR.—Harry S. Hart and Otto W. Meissner, Chicago, Ill., assignors to the Rodger Ballast Car Company, Chicago, Ill. In a hopper-bottom dumping-car of the class described, the combination of a supporting-frame portion, a V-shaped portion extending longitudinally of the car with its apex arranged below the underpinning and at or near the longitudinal center thereof, the inclined side portions of which are provided with lower swinging sections forming a part of each of the inclined sides of the car, and means for closing such swinging sections successively—first one and then the other—by and during one and the same operation, substantially as described.

761,684. CALCINING APPARATUS.—Daniel L. Kibler, Acme, Tex. In a calcining apparatus, the combination with a kettle or shell having flues extending into the same, of an agitator in said kettle, and oscillatory knockers actuated by said agitator and coacting with said flues to remove adhering material therefrom, substantially as described.

761,691. MUFFLE ROASTING-FURNACE.—Franz Meyer, New York, N. Y. A roasting-furnace, comprising a series of roasting-chambers separated by intervening spaces, a heating-furnace common to the series, and flues for the heating-gas connecting with the heating-furnace at one end and the stack at the other through the successive chambers; substantially as described.

761,695. LOADING-MACHINE FOR MINE-CARS.—George F. Myers, Pittsburg, Pa. In a loading-machine for pit-cars, a truck having a turn-table provided with a superstructure having an outwardly-extending arm, a hoisting-drum actuated by said motor, a hoisting-rope operated by said drum and depending from said arm, a shovel connected to said hoisting-rope and a pusher independent of the shovel adapted to push said shovel underneath the coal, substantially as described.

761,727. CONCRETE-BLOCK MOLD.—George S. Tiffany, Tecumseh, Mich. In a mold for concrete blocks, the combination of the fixed side, the ends hinged thereto, the movable front, and means for simultaneously actuating the ends and the front to open and close the mold.

761,742. WELL-BORING TOOL.—Martin J. Woodward, Petrolea, Canada, assignor to American Steel & Wire Company. In a well-boring tool, the combination with the drill-holder formed in two complementary parts comprising a cylindrical section having a bore formed centrally within its upper end, and a tubular section carrying a shank fitting within the bore and having a threaded engagement with the cylindrical section, a conical bearing-surface upon the shank, an elongated sleeve fitting loosely within the tubular section, a head integral with said sleeve arranged within the bore for slight sliding movement, and a frusto-conical shoulder upon the head adapted to engage the bearing-surface upon the shank.

761,746. FURNACE-DOOR FRAME AND DEAD-PLATE.—John E. Wright, Barrow-in-Furness, England. In a furnace, the combination with the casing of the furnace and brick lining within same, of the door-frame, comprising a hollow roof on which the brick are supported, and open in the front to the outside atmosphere, and closed at the inner end; hollow sides having both sides closed and in free communication with the hollow roof at their upper ends; and a hollow dead-plate connected with the lower ends of the hollow sides, and having its interior communicating with the said lower ends, and a discharge-opening in the inner end of the dead-plate, substantially as set forth.

761,761. CONVEYER-CHUTE.—George F. Conner, Port Huron, Mich. A conveyer-chute comprising a trunk, an extension telescoping therewith, extending means comprising plural ropes secured to the lower part of said extension at diametrically opposite points, passing around sheaves secured at diametrically opposite points on the trunk, and means adapted to impart unison movement to said ropes.

761,764. MINER'S-LAMP HOLDER.—Joseph Danner, Scranton, Pa. A device for the purpose described, comprising a curved base-piece adapted to be attached to the vizor of the cap, a member extended up from said base-piece which includes a vertical S-shaped portion, a guard-plate projected upwardly from and integral with the S-shaped portion, and lamp-clamping devices attached to the member that extends up from the base-piece.

761,770. LOADING OR UNLOADING APPARATUS.—Henry J. Killian, Seymour, Mo. The combination with a track, a car mounted thereon, and a stop located upon the bottom of the car midway the length thereof; of means for permitting half the length of the car to pass over the end of the track while engaging said stop, comprising a stop at the end of the track in alinement with the stop on the car but adapted to clear the forward portion thereof.

761,788. COMPOSITION OF MATTER FOR MANUFACTURING SLATES OR OTHER COVERINGS.—Frederick M. Ruschhaupt, Milwaukee, Wis. The herein-described composition of matter, consisting of gum-asphalt, asphaltic oil, sand, clay, talc, fibrous material, and resinate of aluminum.

761,789. COKE-OVEN.—Carl Schroeter, Chicago, Ill., assignor to Chicago Coke Oven Construction Company, Chicago, Ill. In a coke-oven of the character specified, the combination with a coke-retort having a heating-jacket entirely surrounding the same, of means for introducing air and fuel to said heating-jacket and burning it therein, and a regenerator comprising air-inlet and gas-discharge conduits one enveloping the other connected to said heating-jacket through which incoming air and the spent products of combustion are passed in opposite directions, substantially as described.

761,826. BRICK RE-PRESS.—Oscar L. Gerwig, Canton, Ohio. A die having a vertical matrix, vertically-movable plungers one above the other adapted to operate in the matrix, a pendulous shaft above the die, and connecting-rods of different lengths journaled on the shaft and to the respective plungers.

761,870. PROCESS OF MAKING FIREPROOFING SOLUTIONS.—Arthur W. Baxter, London, England. The process for obtaining a fireproofing solution, which consists in fusing sodium and potassium carbonate together with silica, dissolving the fused mass in water, mixing the solution with an aqueous solution of ammonium sulphate, and neutralizing the mixture, substantially as described and for the purpose specified.

761,886. MACHINE FOR MAKING PRESSED BRICK.—Frank Helm, Traverse City, Mich. In a machine of the class described, the combination of a movable mold, a stationary plunger operating in the mold, a removable receptacle for the material having a removable bottom forming a tray, a movable table or platform operable through the receptacle, and means for supporting and tripping the receptacle, substantially as described.

761,900. FLUX COMPOUND.—Newton J. Norman, Jacksonville, Fla. The herein-described welding-flux the same consisting of the following ingredients; sal-ammoniac; saltpeter; sal-soda; yellow prussiate potash; borax and pulverized glass.

761,913. LIME-SLAKING APPARATUS.—John P. Rich, Swanton Junction, Vt. In a lime-slaking apparatus, a movable carrier, receptacles thereon for the reception of lime to be slaked during the progress of said receptacles, means for closing the

receptacles during their progress to retain the steam formed in slaking and means for feeding lime and water into said receptacles, successively.

761,958. WELL-DRILLING MACHINE.—Fred. C. Haar, Gibsonburg, Ohio. In a well-drilling machine, the combination with a frame, of an engine mounted thereon; a shaft 10 bearing a friction-pulley 12, a spur-gear 14 of smaller diameter than the pulley 12, a second friction-pulley 13 smaller in diameter than the pulley 12 and gear 14, and a band-wheel 11; means connecting the engine and the band-wheel; levers for sliding the spur-gear 14 on said shaft 10; a shaft 29 mounted adjacent the shaft 10, eccentrically-arranged bearings in which said shaft 29 is mounted, a drill-rope drum 31 mounted on shaft 29, a friction-wheel 30 on the shaft 29 which is opposite the friction-pulley 13 and larger in diameter than said pulley 13, pulley 12 and spur-gear 14; levers for operating the eccentric bearings to engage the friction-wheel 30 and the friction-pulley 13; a brake-shoe positioned opposite the wheel 30; a shaft 41 mounted under the frame, a bailer-drum carried by the shaft 41, a friction-pulley 42 on said shaft opposite the friction-pulley 12, a brake-block adjacent the friction-pulley 42; levers for operating the said eccentric bearing to cause the pulley 42 and pulley 12 to engage or the pulley 42 to contact with the brake-block; a shaft 21 mounted on the frame adjacent shaft 10, a bull-wheel engaged by the spur-pinion 14, a spudding-beam co-operating with the bull-wheel, guide-rollers carried by the spudding-beam, a derrick mounted on the frame, and rollers mounted on the derrick to guide the ropes, substantially as described.

761,959. HOISTING-MACHINE.—Arthur E. Handy, Providence, R. I., assignor to the Rhode Island Elevator and Machine Company, Providence, R. I. In a hoisting-machine the combination of a hoisting-drum, friction-wheels eccentrically mounted, friction holding-shoes arranged to engage the periphery of said wheels, friction driving-rolls also arranged to engage the periphery of said wheels, means including eccentrics for transferring said friction-wheels alternately from said shoes to said driving-rolls, means for automatically energizing a motor to rotate said driving-wheels and drum to hoist the load when said wheels are brought in contact with said rolls, substantially as described.

762,007. CEMENT-BRICK-MAKING MACHINE.—Ora Staley, Charlottesville, and John A. Johnson, Greenfield, Ind. In an apparatus for producing bricks from plastic material, the combination, with a mold, of a core-box adapted to be projected thereinto and withdrawn therefrom, a hopper surrounding said core-box and leading into the mold, a pair of deflector-plates 23' extending across two sides of said hopper, a pair of hoppers arranged above said deflector-plates, a pair of feeding-plates one forming a side of each of said hoppers, and means for reciprocating said plates whereby a plastic may be fed from said hoppers to said deflector-plates.

762,047. HYDROCARBON-FURNACE.—William E. Gibbs, Fanwood, N. J., assignor of one-half to Henry Berg, Orange Valley, N. J. In a hydrocarbon-furnace, the combination of a vertically-arranged Bunsen tube having means of spraying oil therein, a burner connected with and adapted to receive vapor from and heat said tube, a drainage-pocket arranged beneath said tube and burner proper and adapted to receive unvaporized oil therefrom, wick-tubes connecting with said pocket and entering the heating-space near said burner, and an overflow arranged to maintain a constant level of oil in said pocket.

762,058. RETORT.—Harry Hirsh, Eastman, Ga. In a retort, the combination of a receptacle, means for heating the same, a steam-pipe for supplying hot steam within said retort independently of said means for heating the same, vapor-pipes connected with said receptacle for condensing vapors generated therein, condensers connected with said vapor-pipes, and mechanism for chilling one of said vapor-pipes independently of said condensers, said mechanism being disposed at a point intermediate of said receptacle and said condensers.

762,110. ACETYLENE-GAS MACHINE.—George Anderegg and Frank A. Sell, Red Lodge, Mont. An acetylene-gas generator having a casing, a vertical shaft, a carbide-magazine revoluble with said shaft, a horizontal shaft geared to the vertical shaft, a revoluble member fast with said horizontal shaft and provided with a plurality of beveled lugs, a gasometer-controller lever mounted loosely on said horizontal shaft for turning and sliding movement thereon relatively to the lugs of said revoluble member, and means for moving said lever laterally toward the revoluble member.

762,147. GRINDING APPARATUS.—Danridge Cox, Camden, N. J. A device of the character described comprising a body having a laterally-extending arm integral with one end thereof, and a reinforced bracket integral with the body and overhanging the arm, an adjustable clamping-block supported by the arm, a power-wheel, a bearing therefor detachably connected to and extending through the body, a flange extending inwardly from the periphery of the power-wheel and having teeth upon its inner face, a shaft revolubly mounted in one end of the body and having an angular tapered head at one end, a gear mounted upon said head and having a recess of the same configuration as said head, said gear meshing with the teeth on the flange, means upon the shaft for holding it within the body and for holding the head in engagement with the recess in the gear, a grinding-disk upon the shaft, and means for clamping and rigidly securing the disk upon the shaft-retaining means.

762,151. BUCKET.—William P. Davis, Durban, Natal. A device of the character described comprising a casing, guides secured to the inner surface of said casing, a movable bottom provided with uprights engaging said guides upon the inner surface of said casing, and means connected to said casing and uprights for limiting the movement of said bottom.

762,174. GOLD SEPARATING AND RECOVERING APPARATUS.—William Laudahn, San Francisco, Cal. An apparatus for the separation of gold from sand and the like, said apparatus comprising a mercury-containing chamber having a conical bottom with discharge-passage, a receptacle fitted to and depending from said conical bottom and having oppositely-located controlling-cocks, an open-ended vertical cylinder of smaller diameter, through which material is delivered and submerged in the mercury, revoluble scrapers extending over the upper edge of the mercury-chamber, and by which the same, after rising through the mercury, is discharged, an exterior annular receiving-trough, an air-tube located within and above the trough, and having jet-openings through which an air-blast may be discharged outwardly.

762,183. HYDROCARBON-GAS. GENERATOR AND BURNER.—Clarence H. Montgomerie y Agramonte, Mexico, Mexico. A generator consisting of a retort having an opening provided with vertical walls forming a chimney and a gasifying-chamber located within said chimney and a burner located under said chimney.

762,227. ANODE AND PROCESS OF MAKING SAME.—Henry Blackman, New York, N. Y. An anode for electrolytic apparatus, the exposed exterior of which is of dense impermeable magnetic iron oxide, having a protecting layer of glass or vitreous glaze fused to it in a band around that portion of the anode which is destined to be exposed at the surface of the electrolyte.

762,229. EXPLOSIVE CARTRIDGE.—Giovanni Cornara, Mantova, Italy. In an explosive cartridge, an electrolytic cell having metallic walls, said metallic walls forming a cathode, an alkaline solution within said cell, an anode extending in said cell and free of the cathode and adapted in connection with the cathode to electrolyze said solution, and means extending in a cathode for exploding said electrolytic decomposition.

762,231. GOLD-SAVING DAM.—Edward R. De Normandie, Claysville, Pa. A gold-saver for dental purposes consisting of a rubber dam having an opening therethrough, a pocket located on the rear side of the dam and having the mouth thereof coinciding with the edges of the said opening, and a guard applied over the mouth of the pocket on the front side of the dam.

762,235. ACETYLENE-GAS GENERATOR.—Jerome M. Green, Rochester, N. Y.; Perry S. Darrohn, administrator of said Jerome M. Green, deceased, assignor to Richard H. Thurston, Elmira, N. Y. In a gas-generator, the combination with an outer section or receptacle open at the top and adapted to contain a liquid, of an upper section or casing having a gas-chamber and a surrounding air-chamber, both open at the bottom, an escape-passage leading from the air-chamber, a liquid-sealed passage between the two chambers, said passage leading from the bottom of the generator to the air-chamber above the liquid in the latter, and a holder for gas-generating material in the gas-chamber.

762,239. BUMPING-SCREEN.—Harry L. King, Denver, Colo. In a bumping-screen, the combination of a tappet-wheel having radial lugs, each having one short side and one long side connected at the outer edges by an eccentric curve, said radial lugs forming between them reëntrant angles adapted to receive hard lubricant, and a vibrating frame having its angular edge projected into the said angle between the lugs substantially as and for the purpose described.

762,250. APPARATUS FOR MOLDING CONCRETE BUILDING-BLOCKS.—William Porten, St. Paul, Minn, assignor to Building Block Manufacturing Co., a corporation of Minnesota. An apparatus for molding building-block, comprising a platform, partition-walls arranged between the rows intervals therein, cores fitting within said holes and means for temporarily supporting them therein, side walls supported on and of less length than said platform, partition-walls arranged between the rows of core-holes, means for securing said partition and side walls together and the latter being readily detachable from said partition-walls and adjustable lengthwise on said platform, for the purpose specified.

762,251. BUILDING-BLOCK.—William Porten, St. Paul, Minn., assignor to Building Block Manufacturing Co. As a new article of manufacture, a building-block having vertical recesses in its ends of sufficient depth to receive the hands when the blocks are placed end to end, niches adapted to receive the fingers formed in the bottom of said recesses near the top surface of said block and having downwardly-inclined lower walls substantially as described.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending May 21, 1904.

9,360 of 1903. MAKING ZINC HYDROSULPHITE.—C. Bolle, Manchester. An improved process for making zinc hydrosulphite difficultly soluble in water by acting on zinc dust with sulphurous acid and then adding sodium bisulphite.

14,242 of 1903. CRUCIBLE LIDS.—J. H. R. Appleyard and W. Cranfield, Huddersfield. Crucible lids formed with convex under-surface, so that matters thrown upwards in the process will be returned to the centre instead of running round the edges.

14,361 of 1903. SLAG TREATMENT.—O. Massenez, Wiesbaden, Germany. Method of increasing the fluidity of slags formed in making steel from chromiferous pig iron.

27,132 of 1903. ORE TREATMENT.—G. D. Delprat, Broken Hill, New South Wales. Method of making sulphides rise to the surface in a solution of common salt containing 2 per cent of sulphuric acid.

Week Ending May 28.

9,608 of 1903. CRUCIBLE FURNACE.—Morgan Crucible Company, London. An improved tilting crucible furnace, the object of the improvements being to regulate the discharge more accurately, to supply the air for combustion more evenly, and to keep the outside of the furnace comparatively cool.

12,713 of 1903. MANUFACTURING WHITE LEAD.—Societé Oettli, Berne, Switzerland. The electrolytic production of white lead from metallic lead in an electrolyte consisting of a 1% solution of common salt, at a low voltage, and carbonating simultaneously within the same vessel.

13,073 of 1903. ORE PICKING TABLE.—J. H. & E. Netherton, Trefriw, Wales. A picking table for hand-picking ores, mounted on rollers round which it can be tilted to deliver the picked ore into suitable receptacles.

20,313 of 1903. ELECTRODES.—G. Wedekind and H. Rörschke, Hamburg. Making durable porous electrodes of oxides or of powdered metals, by mixing with a chloride of the same metal and allowing the paste to set in the shape required.

1,695 of 1904. CUPELS.—Morgan Crucible Company, London. Making cupels with dished bottoms so that they stand only on the rim, thus making the absorbed litharge spread equally through the body of the cupels.

6,775 of 1904. MAKING IRON OXIDE.—C. L. Parker, London. Making black oxide of iron by heating carbonate of iron in vessels out of contact with air at a dull red heat for 12 to 24 hours.

SPECIAL CORRESPONDENCE.

Bisbee. June 11.

(From Our Special Correspondent.)

It is worthy of note that nothing approaching copper ore, or, in most cases, nothing favorable, has been found in this district by any of the companies operating here outside the Copper Queen Consolidated and Calumet & Arizona group. It is now two years since nearly a score of companies were formed here and in northern Michigan for the purpose of duplicating the happy experience of the Calumet & Arizona's Irish Mag. Eight of these companies have sunk shafts, two of them to 1,000 ft., several have drifted a considerable distance, and the others have done more or less tunnelling and drilling. Probably not less than $800,000 has been spent on this work, and it is as well to face the facts and assert that at least 75% of this money has been sunk without any fair chance of return.

Wolverine & Arizona is now drifting in the direction of Pittsburg & Duluth, an associated Calumet & Arizona development, and is getting into ground that looks as though ore might be met before long, in more or less quantity. This is proving quite satisfactory to the Wolverine management and the drift will be continued indefinitely.

Houghton Development, which is situated 5 miles southeast from Bisbee, near Gold Hill, is still running tunnels into the side of the hill, and is said to have cut some iron and limestone. This company has had much difficulty with diamond drills and has lost a bit or two.

Drills are still running at Cochise, Calumet & Bisbee, Higgins, Copper Glance, Portage Lake & Bisbee and elsewhere. These are really of little use in determining anything more than the general character of the formation, and this, in some of these cases, was fully known already.

Marquette & Arizona, which has been sinking a shaft some 8 miles southeast from Bisbee, has suspended work indefinitely.

Copper Glance is supposed to have about $4,000 remaining on hand, and this will probably be spent in drilling from surface. After it is expended the company will either quit work for the present or make some new attempt to raise funds. Work will be carried on by others in the immediate vicinity, as a sale of several adjoining claims has just been made to Michigan parties, and Houghton Development is near by. Copper Glance mountain certainly has as rich surface showings of copper as any property in the district. That is not necessarily any indication. Irish Mag, for example, had no surface showings of copper. Its value was determined solely by a careful study of geological considerations and from the northerly Copper Queen workings.

One of the properties of the Duluth & Chiricahua Development Co., situated near Paradise, on the eastern side of Cochise county, in the Chiricahua mountains, is looking very well indeed, and it is possible that a large mine may result.

Work will soon begin in the Leadville group, near Pearce, just taken by George Maas and associates, of Negaunee, Mich., who have a bond on the group for $100,000.

Copper Queen Consolidated has not yet wrecked its old Bisbee smelter, but is working it at full force, while not all the new Douglas furnaces have been blown in. The company's new Sacramento shaft, on the south side of the rock of that name, is going down fast. Gardner shaft's new equipment and 100-ft. steel frame, is going in as fast as possible. At the Lowell high grade sulphides are hoisted.

At the Calumet & Arizona the Irish Mag shaft is to be sunk to 1,500 ft., as ores have been found to extend to that depth at least. In the Oliver shaft the company has been in rich sulphides for some time, and in the drift running to Irish Mag, now connected through, it has found seams of both sulphides and oxides which will be opened as fast as convenient. The Cole shaft of Lake Superior & Pittsburg has been in ore again on the 1,000-ft. level. The ore body there is found to be of the greatest importance. It is known to extend to the 1,100-ft. level, but water has been coming in so fast that work has been much retarded. At Briggs shaft of Calumet & Pittsburg the work of cutting down to five-compartment is completed, the pump columns have been set and the pumps are going in. Irish Mag shaft produced last month 3,050,000 lb. copper.

Butte. June 7.

(From Our Special Correspondent.)

John D. Ryan, the newly appointed manager of the Amalgamated interests in Montana, arrived in Butte from New York last night. Today the Parrot Silver & Copper Company held its regular meeting and elected the following directors: Charles H. Dickey, Charles D. Burrage, Sidney Chase, Arthur W. Bemis, Richard D. Willard, Edward G. Storey and John D. Ryan. Mr. Ryan is the only new member of the board. This was the first meeting of the stockholders of the Parrot company at which they had the power of electing directors since June 5, 1900. At previous meetings they were compelled to pass the election of directors and adjourn, because of the injunction against the company imposed by Judge Clancy in the receivership and injunction cases brought by MacGinniss.

Denver. June 11.

(From Our Special Correspondent.)

During the week Colorado has been passing through an acute industrial and political crisis, the outcome of which is hard to foretell. The Cripple Creek district, whence the military had been withdrawn, has seen riot and murder. Since the outrage on June 6 all efforts to find the perperators of the dastardly plots have proven unsuccessful. The district is again under martial law, with General Sherman Bell in personal charge. A number of public officials have been forced to resign on account of their known sympathy with the union miners, and the district is under complete control of two companies of infantry.

A few days before the present trouble commenced, a committee, appointed by the convention here of the Western Federation, visited the Cripple Creek district and reported to the Federation, which decided to continue the strike. A couple of days ago the newspaper at Victor, which represents the Federation, advocated calling off the strike. The Federation offered $5,000 reward for the apprehension and conviction of the men concerned in the dynamiting outrage at Independence.

The Portland mine, which has been employing both union and non-union men, was closed on June 9, by order of General Bell, in order to complete the shutdown and enforce the "working card" system. The Mine Owners Association intends to look up the record of every man to whom these cards will be issued and will not employ any one without a card. The rule of the unions, which have caused so much trouble, is evidently drawing to a close, and it is to be hoped that peace and harmony will again prevail in the community. Wholesale deportations of agitators continue.

In the Las Animas county coal field the military rule is ended. Except for about 70 men under Major Hill, the troops which have been stationed there have returned to their homes. The remaining soldiers will be under the civil authorities.

President Alderson, of the State School of Mines, has started from here on a few week's trip, during which he will visit St. Louis, the Massachusetts Institute of Technology and Harvard University. In his address to the graduating class of the school a few days ago he read letters from President Elliott, of Harvard; Prof. Gunsaulus, of the Armour Institute of Technology, and Mr. John Hays Hammond. At a meeting of the board of trustees of the school, W. F. Allison and S. H. Worrell were appointed to the chairs of civil engineering and chemistry, respectively.

Another important summer school in geological field work in the San Juan mountains of this State, has been arranged by C. H. White, instructor in mining and metallurgy at Harvard University for the students of that institution, who under his guidance, after visiting St. Louis, will make an extended trip through the West.

An interesting deal has been concluded here between the owners of the Saratoga mine and the Newhouse tunnel management. The mine is to be worked through that tunnel, when driven about 1,500 ft. farther at an estimated cost of about $25,000. The tunnel now is about 2.5 miles long, and nearly $500,000 has been spent on it.

The verdict of the coroner's jury on the Independence dynamite outrage found that the crime, with others, was the result of a conspiracy entered into by certain members of the Western Federation of Miners and was known, incited and furthered by certain officers of that organization.

Duluth. June 11.

(From Our Special Correspondent.)

The big steel ship *Augustus B. Wolvin* is "marked up" at the Two Harbors docks of the Duluth & Iron Range road to leave about June 17 with her first eastbound cargo, and is booked for 10,000 gross tons. This is more than 2,000 tons greater than has ever been carried out of this lake, and exceeds *Wm. Edenborn's* banner Lake Michigan cargo by 1,793 gross tons. That load, however, was taken on a draft of 20 ft., while *Wolvin* cannot load much better than 18 ft., particularly as this is her first cargo down. The *Wolvin's* cargo of 10,300 tons of coal upbound, exceeded the largest before carried by 2,600 net tons.

Ships of all fleets are gradually getting into line, and a number of ore cargoes have been cleared the past few days. The ore roads have not put summer schedules in force, and may not for a short time. Their docks are full and the regular service brings enough ore for the present. The situation in business circles on the Lake Superior ranges is clearing and the extreme dulness that has prevailed of late, worse than that of the panic years of 1893-4, is giving way to activity.

It looks now as though no mining might be done in the Nashwauk district of the Mesabi range this year. Nothing is going on there now, and the Great Northern road, which built a very expensive line to three mines there a year ago, will probably make no earnings from it before 1905. Some mines in this section have proved unsatisfactory, but will come in later. Restriction of operations about Nashwauk makes Forest mine, of the Tesora Mining Co., the most westerly active property on the Mesabi. The Wallace Contracting Co. is now stripping surfaces there. This is a small job. Forest produces a nice grade of ore, some of which, it is understood, has been sold for this year. It has a very slight surface covering ore, but a foolish attempt was made last fall to open it underground. Forest and Stevenson are the only two active mines west of Hibbing.

The various Great Northern companies with headquarters at Marquette, Mich., and properties on the Mesabi range, in T. 57, R. 21 and T. 58-20, have been put on the tax rolls in Marquette county for above $1,000,000. There are eight of these companies.

Duluth & Iron Range tracks are being laid to the Bessemer shaft of the Republic Iron & Steel Co., at Virginia, Mesabi range. Bessemer went into the winter with a small stock on surface and was one of the company's three Mesabi mines that operated during the winter, the others being Franklin and Pettit. Its Kinney mine will ship shortly. Its Wills and perhaps its Victoria will do nothing this season.

At the annual meeting of the Zenith Furnace Co., of Duluth, owning the Zenith blast furnace and by-product ovens, the following were elected directors: W. L. Brown, C. B. Wheeler, Chicago; A. B. Wolvin, A. M. Marshall, C. A. Duncan, A. D. Davidson, C. W. Andrews, Duluth. These re-elected former officers, A. B. Wolvin, president; C. W. Andrews, vice-president, and J. L. Washburn, secretary. The company's large coking plant will start about July 1. The furnace will start soon after, making about 250 tons daily. It will be blown in for bessemer pig.

San Francisco. June 8.

(From Our Special Correspondent.)

Several new oil pipe lines are being considered from the Kern county fields to the coast. For coast terminals Port Harford, San Luis Obispo county and Monterey, seem to lead. A 4-in. pipe line is being built to Monterey, a distance of some 90 miles. The other

lines are only projected at present. A survey gang is at work on a line from the west side districts to Port Harford. From Midway to Port Harford is about 70 miles. The only pipe line in actual operation is that of the Standard Oil Co., from the Kern river fields to Point Richmond on San Francisco bay, but that has been giving trouble, owing to the heavy oil not flowing as freely as expected. Furnace No. 1, of the Mountain Copper Co., at Keswick, was wrecked last week with considerable loss; several men were injured and one killed. The furnace had been drawn to permit repairs and somebody with less sense than energy turned on water, causing an explosion.

George W. Rumble, of the Sunset Mining Co., has been sentenced by Judge De Haven, of the United States District Court, to 18 months imprisonment at hard labor and to pay a fine of $500, the limit for persons found guilty of using the mails with intent to defraud. A motion for a new trial was denied, but 30 days were allowed in which to file a bill of exceptions on appeal. A bond of $10,000 was exacted. Most of the people who were swindled by investing in stock of the Sunset company are at points east of the Rockies, and Rumble gained a rich harvest from them. It was shown in court that he had in different banks $355,000 in his own name or that of his wife, but none deposited for the company. Many of the statements in the circulars he sent out were absurd to a mining man, but Rumble evidently knew the kind of people he could catch, and caught them. No more mail will be delivered to him or to the Sunset Mining Co., but it will be stamped "fraudulent" and sent back to Washington, there to be forwarded to senders, and those trying to get money back will accomplish little by writing to Rumble or the company. Rumble was about the boldest of the fraudulent "promoters" who have operated in California.

The United States Court of Appeals here has affirmed the decision of the lower court of Idaho in the case of the Empire State Idaho Mining & Developing Co., appellant, against the Bunker Hill & Sullivan Mining & Concentrating Co. The appeal was from a decree quieting the Bunker Hill title to the Stemwinder lode claim, defining its extra-lateral rights and to the ledge apexing inside the surface boundaries of the claim. The original locators thought the vein ran east and west and took up the usual 1,500 ft. on that line, but subsequent developments proved it ran the other way. The decision says: "While it was contemplated by Congress that every location was to form a parallelogram not to exceed 1,500 by 600 ft. in size, yet the purpose was also to permit the location to be in such a way as to secure not to exceed 1,500 ft. along the vein, and it was expected that the locator would so place it in his judgment as to make a location lengthwise covering the course of the vein. There was no command that the side lines should be parallel, and the requisition that the end lines should be parallel was for the purpose of bounding the underground extra-lateral rights which the owner of the location might exercise."

A series of actions has been brought against Cerf and Joseph Rosenthal concerning the Pine Hill property in Nevada county. Two suits have been filed in the United States Circuit Court here, and an action of ejectment in the Superior Court of Nevada county. The Pine Hill Mining Co. is composed of New York men who bought from the Rosenthals two years ago. The mine is well equipped with machinery, including a 10-stamp mill, but this litigation will stop work for a time. The complaints charge that the Rosenthals have in various ways defrauded the company.

According to dispatches received here from New York the revised specifications for asphalt paving contracts in that city exclude California asphalt from competition. Naturally the asphalt producers of this State are aroused, especially when they know that the product made here is perfectly pure and durable. Most California asphalt is a residuum from oil refining, as California oil has an asphalt base. Some of our oils carry as high as 20% asphalt. The manufacturers claim it to be a better and purer product than that from Trinidad. The large annual product of this refined asphalt has closed the mines of natural asphalt in this State. The output is now nearly 100,000 tons annually, many refineries having been started within a year past. The California asphalt is guaranteed 99% pure, while that from Trinidad is only about 55%. Boston, Philadelphia, Chicago, and many other cities in the East are using large quantities of California asphalt.

The copper properties of Del Norte county, particularly those near Smith river, which have long been known to be valuable, have just begun to be developed. The Cleopatra Copper Co. has from 30 to 40 men at work on four mines, though it owns 45 claims. The ledges vary from 6 to 60 ft. wide, and the ore in the backs of the claims opened is estimated at 73,333 tons, carrying 9% copper and some gold. The company is not shipping, but is preparing to erect a 200-ton smelter and will build an electric road 29 miles long to the coast. John S. Crawford, of Grant's Pass, Ore., is manager and one of the owners. The other owners of the group are James D. Lacy, of Chicago, and Roger W. Butterfield and Thomas N. Peck, of Grand Rapids, Mich. This is a new copper region, but is of great promise.

In the San Joaquin valley, scattered through a territory of 800 square miles, are numerous wells of water carrying gas. In a few of these the air lift system is used for increasing the flow of water for irrigation. But thus far no attempt has been made to increase the flow of natural gas. A. S. Cooper, of this city, former State mineralogist, has patented a method of pumping these wells by compressed gas instead of air, using the gas from the well itself, thus largely increasing the flow of both water and gas. The water is generally used for irrigation and sufficient gas is obtained to run the compressor for the gas lift, thus making the well self-operating. By the gas lift a large area of the San Joaquin valley can be irrigated at comparatively small expense.

Testimony is now being taken in the injunction suit of the United States against the Mountain Copper Co., of Shasta county, by a special examiner appointed by the United States Circuit Court. The government contends that the fumes from the company's roasters have ruined vegetation in the surrounding country during some years past, and especially forest trees. The suit is the result of complaints by a few small orchardists near Keswick.

The two very large dredgers on the Yuba river near Smartsville are expected to start up within a few weeks. The two cost about $100,000 each, and are intended to dig 60 ft. below water line, or almost twice the depth the present machines are working. It may be stated that the assessors of Yuba county are in doubt how to assess dredging land, most of which has been absolutely valueless, and the rest rated at a very low figure. The dredge men are protesting against raising assessments on such land, since much of it has been idle for years, and want the land assessed only as it is worked, the balance being of no special value as it stands or after it has been worked over. Gold bearing lands are now held at from $500 to $1,000 per acre, but are useless for anything but the dredge. The drill has shown gold, but it is of no value until the dredges begin work. It used to be assessed at say $7 per acre, some as low as $2.50. The assessment was raised to $65, then $100 was suggested, and now the assessors are talking of two hundred dollars.

Spokane. June 10.

(From Our Special Correspondent.)

After a shutdown of six months the Gold Hunter mine in the Coeur d'Alenes is busy again. W. A. Bradley is in charge and about 30 men are employed. The number will be slightly increased. The property has been operated at a small loss for the past two years.

High grade galena is reported in the recent strike on the Douglas, near Wardner, in the Coeur d'Alenes. Zinc in the ore from the run of the mine has lead to experiments at Denver, to determine a process for treating the ore.

The Crystal Marble Co., operating a cutting up mill here and quarries at Colville, in Stevens county, expects to install a channeler and the two derricks at its works, which will increase the output. Marble is being shipped over Washington, Idaho and Oregon and as far east as Wisconsin.

Extraordinarily good returns are being reported by the Bunker Hill & Sullivan Co., operating the famous mines at Wardner, in the Coeur d'Alenes. The Bunker Hill was in pretty bad shape a couple of years ago, as the ore reserves were getting low. Development since then has done much, and there are estimated to be $3,000,000 net in sight.

A. E. Palmer, president of the Mountain Lion Co., operating the mine at Republic, Wash., says that he has secured a $5 freight and treatment rate from the British Columbia smelters, and will resume shipments. Meanwhile he will continue experiments at the Mountain Lion mill, until a process for treating the ores economically has been found. The mill was running lately on the Hendryx process except that instead of using electrolytic precipitation, zinc shavings were used. Experiments indicate that concentrators can be used to advantage.

The Central Idaho Mining Bureau at Lewiston, Idaho, will ask the Idaho Legislature at its next session for $25,000 to build 40 miles of wagon road from Stites, up the south fork of the Clearwater river and other water courses to Buffalo Hump. The road would be entirely on a water grade. At present the road via Grangeville is impassable for machinery much of the time, on the high divides.

W. H. Plummer, of Spokane, has taken a bond for two years on the Cougar mine 12 miles from Sumpter, Ore., and has gone east to place the property. The Cougar Company is controlled by Spokane people.

H. C. Bellinger, superintendent of the Leonora smelter at Crofton, B. C., who passed through here on his return from a trip to Utah, says that he expects to start both furnaces at the smelter for a continuous run within six weeks.

The Skookum case involving nearly $400,000 and an eighth interest in the Skookum mine at Wardner, Ida., is not ended. After having fought the Empire State-Idaho Co. through eight appearances in the Court of Appeals and three times in the Supreme Court of the United States, Kennedy J. Hanley, of Kellogg, Idaho, finally got judgment for his interest, and also heavy damages, but now George Turner and Frank T. Post, for the defence, have secured an appeal, as to the amount of damages, and the case will be heard again at the sitting of the Federal Court of Appeals at Seattle in September. The defence expects to take the case clear to the United States Supreme Court again. Mr. Hanley's case rests on allegations of fraud and conspiracy on the part of Charles Sweeny and F. Lewis Clark, of Spokane, who originally purchased his eighth interest.

Indiana people who expect to build a smelter near Keller, Wash., on the south half of the Colville reservation, are starting work. Machinery for a sawmill is on the ground and men are getting out lumber.

Toronto. June 11.

(From Our Special Correspondent.)

Messrs. Appleton and Primeau, two Michigan men interested in Canadian copper properties, recently interviewed Hon. E. J. Davis, Crown Lands Commissioner, and T. W. Gibson, Director of Mines for Ontario, urging the Provincial government to aid in the erection of a copper smelter in the copper-bearing region, north of Lake Huron. The ore from Salter township at present must be exported either before or after concentration at heavy freight charges. On a recent shipment of ore to New Jersey, the value of which was about $425, the freight charges amounted to $150. It was suggested that in view of the benefits to the district which would accrue from building a smelter capable of treating 100 to 150 tons of ore per day, the government should aid the project by a substantial bounty.

The Leamington (Ont.) Oil Co. has shot its sixth well at a depth of 1,047 ft. This makes its fourth flowing well and promises to be a good one. It has also two pumping wells.

The Laurentide Mica Co. is having a new factory built at the Chaudiere, Ottawa, having outgrown its present quarters. It expects to occupy the plant about August 1.

The revision of the tariff announced in the Canadian House of Commons on June 7, makes comparatively few changes of importance. The duty on coal oil is reduced from 5c. to 2½c. per

gal. Crude petroleum is admitted free and a bounty of 1.5c. per gal. paid to Canadian petroleum producers. A provision regarded as likely to benefit the steel industry is that known as the "dumping clause," whereby when it appears to the satisfaction of the Customs authorities that the selling price of any imported dutiable article is less than the fair market value, a special duty shall be imposed equal to the difference between the fair market value and the selling price. The free admission of machinery and appliances of a kind not made in Canada for use exclusively in alluvial gold mining is continued until July 1, 1905.

The provisions of the dumping clause are made applicable to imported round, rolled wire rods not over ⅜ in. in diameter, notwithstanding that such rods are on the free list. It is provided, however, that the special duty in this case shall not exceed 15% ad valorem. This is regarded important by those interested in the steel industry.

D. H. Ross, Canadian commercial agent for Australia, reports that many hundreds of tons of sulphate of copper are used annually in Australia as a preventive of rust in wheat. Some imported brands sold are 99.85% pure. A Melbourne firm asks for prices f. o. b. New York of Canadian sulphate of copper in large quantities.

The erection of the plant of the Imperial Steel & Wire Co. at Collingswood, Ont., has been steadily proceeding for some time and is now nearing completion, the final contracts having been awarded. It will be one of the largest and most modern wire-drawing plants in America, providing for an output of 100 tons of wire daily. It is being installed by Turner, Vaughan & Taylor, wire mill engineers, of Cuyahoga Falls, O., and it is expected that the works will be in operation by July. The town assisted the enterprise by a $25,000 bonus.

Victoria. June 7.

(From Our Special Correspondent.)

Telegraphic advices from Dawson announce that since sluicing began on May 8, royalty has been paid on 55,753 oz. gold. The water supply is stated to be holding out well.

The Provincial Government has decided to issue licenses without further delay to all original applicants for coal and oil lands in the East Kootenay blocks which heretofore have been reserved by the Crown.

In the Atlin district, work on the creek claims has begun for the season. The British America Dredging Co. has also started dredging.

It is reported that a fine seam of coal between 2½ ft. and 3 ft. thick has been discovered near tidewater at Wulffsohn Bay, over 50 miles north of Vancouver on the mainland coast. The outcrop of coal has been followed three miles.

The Wellington Colliery Co. is endeavoring to find a market for its Vancouver island coal in Mexico, the San Francisco demand, by the increasing use of oil for fuel purposes, having fallen off.

The Kingston & McMinnville groups of claims, in the Camborne district, have been sold for the reported sum of $200,000, and a 10% payment made. The Kingston, which has a promising showing of free milling quartz, has been developed by two tunnels driven in on the vein, the average values being about $12. A meeting of the Payne Co. was held last week, when it was decided to issue bonds to the value of $90,000, to wipe off present indebtedness and provide funds to continue development. $20,000 were raised at the meeting. An important strike of high grade dry ore is reported at a depth of 400 ft. on the Pontiac group on Woodbury creek, in the Ainsworth district.

The passage of the amendments to the lead bounty act, whereby the bounty will be payable on all ore mined in British Columbia, whether treated in this country or exported for treatment, will in all probability lead to the exportation of a large tonnage of lead ore through Vancouver to Antwerp. A representative of one of the principal mines has already arranged for the shipment of 3,000 tons every two months on a yearly contract. The passage of the amended act will, at any rate, result in the production this year of a much larger tonnage of lead than would have been made otherwise, while mines, like the St. Eugene, will be in steady operation.

Another case of the location of a placer claim over a rich quartz location is reported, a man named Studd having staked an alleged placer claim within the boundaries of the Nickle Plate mine, owned by the Yale Mining Co. at Hedley. The placer claim has been staked, in fact, over the glory hole from which the 40-stamp mill which began crushing a week or so ago, is supplied with ore.

The Crow's Nest Pass Coal Co. has paid an April dividend of $2.50 per share, making a total of $968,947 distributed to date.

Monterey. June 7.

(From Our Special Correspondent.)

Several new smelters are contemplated or decided on, for various parts of Durango. The largest is the 1,000-ton smelter which the American-Mexico Mining & Development Co. is planning. The only point in question is whether it shall be at the mines or at Torreau, where the company has an option on 100 acres of land. Next in importance is the one talked of for the Velardeña Mining & Smelting Co., recently purchased by the Guggenheims. This would be in connection with the contemplated 400-ton concentrating plant, and is dependent on whether the Guggenheim Exploration Co. will go into the smelting business, or leave that entirely to the American Smelting & Refining Co. The first improvement at Velardeña will be the erection of a 3,000-h. p. electric plant to supply the entire property. A 200-ton pyrite plant known as the McDonald smelter, has been ordered by El Lustre Mining Co., of Santa Maria del Oro. Walter E. Kock, general manager. It is claimed the coke in the charge can be kept down to 6%, and the total cost of smelting to $1.60 per ton. The Restauradora, of Guanacevi, is installing a 100-ton cyanide plant to replace amalgamation. It is understood that the Santa Lucretia, a gold property near the Pedreguera and the Santa Rita, which were recently sold to Joseph Scott, of London, has been sold by Vicente Estrada for $3,000,000, Mexican, to an American company, which has already ordered new machinery to work the property on a much larger scale.

In Coahuila the Guggenheim Exploration Co. has experts examining the properties of the Panuco Copper Co., near Monclova. H. C. Smith, president of the Pacific Lumber Co., and others, are, as the Coahuila Coal & Oil Development Co., exploring and developing the coal and oil, fields in the Monclova district, where the company has had a diamond drill in charge of H. F. Collins. A 3-ft. seam on the San Blas Hacienda, and another at San Salvador, are estimated to contain about 9,000,000 tons. The properties are about 30 kilometers from the Aurora station of the International Railroad, and the survey for a connecting line has been made. Messrs. Murphy & Ihlsing, who have been working some time on the concentration of old dumps in Mexico, expect to start this month on a two years' contract at the dumps of the mines of Vicente Garza, at Muzquiz, Coahuila; they are also negotiating with the Concepcion mine at Catorce, San Luis Potosi, to work the tailings of some 100 years at the company's Hacienda in Cedral. The San Carlos Copper Co. has instituted suit for $40,000, Mexican, against Melville & Kelly, of Saltilla, for non-fulfillment of contract for building a railroad from Linares station of the Mexican Central Railroad to San José.

The expert sent by the Dupont Powder Co. is said to have reported that the sulphur deposits at El Humeros were too small to bother with.

Henry Eastman, of Brownsville, Pa., and T. J. Underwood, of the Crescent Coal Co., of Pittsburg, Pa., are examining the coals of various Mexican fields in search of a good coking coal.

A new company, known as the Sonora Oil & Development Co., has been organized by F. Draper to prospect for oil south of Nogales, in Arizona and Sonora. The Green Consolidated Gold Co. has been organized under the laws of West Virginia, with a capital of $5,000,000 gold, to work placer grounds of something over 6,000 acres, on the Santo Domingo river, in the Magdalena district. The company, it is said, has ordered American machinery worth $225,000 gold for handling 2,000 yards of earth per day, and expects to be in operation next November. The Santa Rosa, near Arizpe, is to be worked by George Mitchell, former manager of the Greene Consolidated Copper Co., and La Cubana, also near Arizpe, is expending $50,000 gold on development work and reduction plant. Las Chispas, of the same district, which has produced over $1,000,000, is likewise putting in a large mill. Sierra Tordilla is a new camp, west of Fronteras, to which many are going. In Jalisco, Chicago people are preparing to develop the Rosa Amarilla, a copper property, near the Natividad, and about a day's horseback ride from Manzanillo.

The Pacific Steel Co., which contemplates starting blast furnaces at San Diego, Cal., is purchasing large tracts of iron lands near the mouth of the Balsas river, in Guerrero and Michoacon.

London. June 4.

(From Our Special Correspondent.)

A few weeks ago I recorded the death of Mr. Frederick Gordon, who was one of the mainstays of the West African mining market. This week the same market has lost Mr. Percy Tarbutt, who died somewhat unexpectedly, at the age of 55 years. The West African craze, from the promoters' standpoint, fizzled out two years ago, but Mr. Gordon and Mr. Tarbutt really believed in the country, and their interests were more substantial than those of the average promoter. Mr. Tarbutt was originally an engineer, and was a member of the Institution of Civil Engineers, but of late his energies were chiefly occupied with company management. His qualifications as a director of mining companies were undoubted, for he combined a knowledge of financial administration with experience in engineering work. Many people, seeing the long list of his directorships, mistook him for a guinea pig, and as he did not believe in self-advertisement, many wrong impressions of his work went uncorrected. His interests were by no means confined to West Africa, though that section of the market will feel his loss the most keenly. In the early days of the Consolidated Goldfields of South Africa he was consulting engineer to the company. Later on he became a director, and he was chairman of the South African Gold Trust. He also joined the board of the London Joint Stock Bank, as representative of the Consolidated Gold Fields, which provides the bank with a very large amount of deposit capital. It will be seen, therefore, that Mr. Tarbutt was a man of substance and influence, in spite of the fact that his sanguine hopes of West Africa have not, so far, been verified by events.

It is a pity that the efforts of Bewick, Moreing & Co. to place mining finance on a proper business footing, do not receive more encouragement from the financial press. The objection of the financial press and of speculators is well voiced by a letter that appears in one of the daily financial papers. The writer says: "If you reduce the dividend and write off from the profits unnecessarily large sums, it tends to depreciate the value of the shares enormously." Exactly. In other words, the distribution of dividends without a provision to protect the capital and assets of the company creates an entirely fictitious value for the shares. This suits the speculator, whose desire is to sell his holding by false pretences. The letter I refer to was written in connection with the publication of the report for 1903 of the Sons of Gwalia Co., one of Bewick, Moreing & Co.'s West Australian mines. There was a net profit on the year's work of £143,000, to which must be added £38,000 brought forward from the previous year, making the divisible amount about £180,000. Out of this it was proposed to pay £79,500 as dividend, being at the rate of 25%, and write off £80,000 for depreciation of plant, cost of sinking shafts, etc. It is a pity that financial papers should insert such letters, at any rate without a word of explanation. There has also been a good deal of bickering amongst speculators this week in connection with the Great Boulder Perseverance. It will be remembered that only a few weeks ago the management of the mine was placed in the hands of Bewick, Moreing & Co., owing to Mr. Frank Gardner being obliged to withdraw from the control. The first thing Bewick, Moreing & Co. did was to make a close sampling of the whole mine. In Mr. Gardner's time it was not considered necessary to do more than make a general esti-

mate of the value of the ore. The ore was developed extensively, three or four years' supply was blocked out, and it was estimated to run at about 1.25 oz. per ton. Bewick, Moreing & Co. have found that on some of the slopes the ore encountered is of lower grade than was figured, and consequently are inclined to reduce the estimate of average contents by 25%. This difference in value could not possibly have been foreseen by Mr. Ralph Nichols, the manager, for even if the same close sampling had been undertaken by him when making last year's estimate, the ore bodies are such that the comparative poverty of some of the ore would not have been revealed. This incident has been absurdly exaggerated in the mining market and all kinds of accusations against directors and managers have been flung about haphazard by speculators and self-elected moralists. The baselessness of all such attacks is obvious to any one who understands mining.

The Venture Corporation is now going ahead, having got rid of its many entanglements to which I referred in these columns a few months ago. The Camp Bird promises to be a more satisfactory possession than Stratton's. The Esperanza was recently floated successfully, and now the Dolores deal has been completed. The latter mine is situated in Guerrero district in Chihuahua, and was acquired from the Mexican owners by an American company, of which Mr. John B. Farish is president. An English company called Dolores, Limited, has been formed to acquire the shares in the American company.

Johannesburg. May 16.

(*From Our Special Correspondent.*)

The rainy season seems to be over now and we will have dry, sunny weather for four or five months. April, May and June are the best months of the year at Johannesburg. One shudders to think of July, August and September. The mines are better off for water than for many years past, all the dams being full to overflowing.

A striking instance of the inefficiency of the railway system in South Africa, and its bearing on the high cost of living and materials at Johannesburg occurred recently. A load of lumber and mining timber arrived at Durban harbor. It cost as much to unload this timber and bring it to Johannesburg as it would to take the cargo back to New York, unload and carry it across the American continent to San Francisco. This gives an idea of the disadvantages we labor under here. Yet the railroads are run by the government. After this let no one advocate the State ownership of railroads. It is a failure.

LANE CARTER.

Perth. May 9.

(*From Our Special Correspondent.*)

The April gold field was a record one, 216,573 oz., valued at £768,836, bringing the total for the four months up to 785,994 oz., valued at £2,790,285.

Kalgoorlie.—Further important developments have been made in the Associated mine owing to recent discoveries of a new formation at the 1,000-ft level. A drill hole from the eighth level cut 7 ft. of lode material, showing $18 gold per ton, then passed through 70 ft. of country rock, into a second body 4 ft. wide, worth $37 per ton, then through another strip of country into a further ore body 14 ft. wide, and again penetrated 24 ft. of ore—the whole gold bearing—the average value of the bodies being $35 per ton. This boring indicates an immense block of high grade ore between the two levels. At the Golden Horseshoe the additions to the milling plant are proceeding rapidly and the whole 150 head of stamps should be dropping within three months, when the output of gold is expected to be upward of 20,000 oz. per month. At Lake View Consols development work is in progress at the 1,600-ft. level, where telluride ore was recently struck. Bulk assays now average over $10 per ton. Good developments have been made also in North Kalgoorlie at the fifth level; ore 10 ft. wide and worth $14 per ton is obtained. A find of importance, as showing a possible extension of the present payable area has been made in the Boulder Deep Levels mine, at the 900-ft. level. The Paringa Co. is driving at the 200-ft. level in good ore 2 ft. wide. The celebrated rich Brownhill run of ore has been followed to the south across the Oroya north block right to the boundary of the Associated, so it is almost certain that it will be found in the latter company's ground.

Coolgardie.—At Bayley's mines good stone is obtained from the 900-ft. level. The battery is being started.

Menzies.—Twenty-four tons of stone crushed from the Little Wonder lease, yielded 163 oz. gold.

Murchison Fields.—The Great Fingall Consolidated is looking well at all points. Rapid progress on additional stamps is made. The Great Fingall Associated, a local company, has recently obtained a favorable report on the property by Mr. Dudley, manager of the Emperor mines.

Sydney. April 28.

(*From Our Special Correspondent.*)

Victoria.—The gold yield for 1903 was 774,219 oz.; dividends amounted to £601,152. Bendigo mines raised 224,747 oz. and paid in dividends £319,370. For the first quarter of 1904 the Bendigo yield was 60,505 oz., an increase of 14,146 oz. as compared with 1903. For the same period Ballarat mines crushed 38,038 tons for 12,555.25 oz. of gold.

The total gold yield of the State for March was 60,322 oz. fine and for the first quarter 169,459 oz. fine. Notable crushings are: Band & Lock, 285 tons for 165 oz. gold; Jubilee, 2,174 tons for 901 oz. Long Tunnel Extended, 290 tons for 351 oz.

Tasmania.—The gold returns for March show 3,632 tons crushed and 3,101.5 oz. gold extracted. The mineral exports for March are valued at £132,615. The general returns are valued at £151,909, including copper, £60,193; silver lead and ore, £31,982; tin ore, £27,431.

The Mount Lyell returns for March show 30,949 tons treated; the converters produced 777 tons blister copper, containing 767 tons copper, 80,358 oz. silver and 1,854 oz. gold.

Queensland.—The gold yield for March was 55,708 oz. fine and for the first quarter 145,027 oz. fine gold.

Charters Towers mines during March paid dividends amounting to £30,000 and made calls £8,500. The average value of the stone was 92s. 2d. per ton. The best returns were:

Brilliant & Central, 1,610 tons crushed for 1,685 oz.; Brilliant & St. George, 1,200 tons crushed for 903 oz.; Brilliant & St. George, 1,164 tons crushed for 839 oz. and cyanide bullion worth £2,100; Queen Cross Reef, 1,310 tons crushed for 3,465 oz.

Gympie mines crushed (during the first quarter) 47,273.25 tons of ore for 37,128 oz., and paid dividends amounting to £67,365. The average value of the stone was 52s. 5d. per ton.

New South Wales.—The Broken Hill output for the first quarter of 1904 was nearly 50% higher than that for the similar period of 1903 and amounted in value to £317,853. This was made up of: Silver lead crudes, 81,780 cwt., valued at £12,259; silver lead concentrates, 1,122,520 cwt., £205,304; silver lead slimes, 306,200 cwt., £15,401; zinc concentrates, 176,120 cwt., £16,226; gold, 823 oz., £3,292; tin and copper, £688.

The Proprietary output for the last four weeks shows a decrease, 386,733 oz. silver, 5,475 tons lead, 47 tons antimonial metal. The Proprietary smelters for March put out 463,318 oz. silver and 5,880 tons of lead. During the last two years this mine has turned out 10,390,847 oz. of silver and 125,480 tons of lead, an average of 100,000 oz. silver and 1,200 tons of lead per week.

The White Cliffs opal field is undergoing considerable depression owing to congestion of purchasing agencies, £2,000,000 worth of opal has already been produced.

The mineral exports from the State for March amount to £953,676, a net increase of £109,549 as compared with the corresponding period of 1903. Increase in value of silver, copper and tin, but decrease in value of coal. Made up of: Silver, ingots and matte, 299,510 oz., £31,517; silver lead concentrates, ores, etc., 81,078 tons, £410,024; copper, ingots and ore, 2,394 tons, £121,170; tin, ingots and ore, 590 tons, £73,053; coal, 718,200 tons, £317,907.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL.—Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL, and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodations in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep the ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. Ben. B. Lawrence is at Denver.

Mr. Percy L. Fearn has returned from Idaho.

Mr. A. C. Beatty, of Denver, is in New York.

Mr. E. Graham Price, of Kalgoorlie, is on a visit to London.

Mr. Noel Brown has returned to England from Cape Colony.

Mr. C. W. Purington is expected at Dawson, Yukon territory, on June 17.

Mr. F. R. Carpenter left Denver recently for the Lake Superior copper districts.

Capt. A. F. Lucas, of Washington, sailed by the *Potsdam* for Europe on June 14.

Mr. G. H. Blakemore is manager of the Great Cobar copper mine in New South Wales.

Mr. George A. Schroter, of New York, is examining mines in southwestern Colorado.

Mr. Geo. A. Packard sailed on June 10 from Seattle on his way to southeastern Alaska.

Mr. J. Langeloth, president of the American Metal Co., of New York, has gone to Europe.

Mr. Walter G. Perkins is metallurgist at the Northport smelter, at Northport, Washington.

Mr. H. G. V. Adler, of London, has returned from a journey to Australia and South Africa.

Mr. F. C. Roberts has left Mexico City to carry out an investigation of mines in Oaxaca.

Mr. Charles E. Eagan, manager of the Peck mine, near Prescott, Ariz., is now in New York.

Mr. J. Lanyon has resigned as manager of the ore buying department of the Lanyon Zinc Co.

Mr. W. E. Defty has gone to Sonora, Mex., and will remain there until the beginning of July.

Mr. Fernando Sustersic, of Durango, Mex., is examining mines at Ameca, in Jalisco, Mexico.

Mr. L. H. L. Huddart, of the Mineral Survey of Southern Nigeria, has returned to London from Africa.

Mr. S. F. Parrish has resigned his position as general manager of Le Roi Mining Co. at Rossland, B. C.

M. Andre Vicaire, professor in the School of Mines, St. Etienne, France, is visiting the gold mines of Colorado.

Mr. Frank Robbins, of Los Angeles, Cal., is examining mining properties near Manuel, San Bernardino county.

Mr. Bertram Hunt has returned to San Francisco for a brief holiday. He will return to Costa Rica in July.

Mr. J. Trowbridge Bailey, of the Engineering Company of America, has just returned to New York from Alabama.

Mr. N. C. Bonnevie has returned to Denver from northern Wyoming, where he examined the Sunrise copper mines.

Mr. A. A. Steel, of the Engineering Company of America, is examining some low grade gold properties in Colorado.

Mr. W. E. Thorne, of Denver, goes to Dillon, Colo., to act as superintendent of the Oro Grande Mining Company.

Mr. W. W. J. Croze, of Duluth, is at Kings Mountain, N. C., engaged in the investigation of the tin deposits of that district.

Mr. Ernest du B. Lukis has changed his address from Colisea Nueova, No. 4, to La Independencia No. 4 in the City of Mexico.

Mr. Charles M. Schwab has resigned as a director of the International Nickel Co., and is succeeded by Mr. Wm. Nelson Cromwell.

Mr. J. W. Rayfield, formerly manager of the Lady Shenton mine, at Menzies, W. A., will shortly return to the Straits Settlements.

Mr. Frank L. Nason, who has just returned from Georgia, has gone to the Bay of Fundy to examine mining properties for New York men.

Mr. S. B. Christy, professor of mining at the University of California, is visiting St. Louis in connection with the University exhibit.

Mr. George P. Maury, of the metallurgical laboratory, Pittsburg, Pa., is examining properties in Joplin, Mo., district for Pittsburg men.

Mr. Francis A. Thomson has been appointed superintendent of the New Western Reduction Co. at Forks Creek, Clear Creek county, Colorado.

Mr. Henry Jones has been appointed superintendent of the mills of the United Steel Co., Canton, O., succeeding Mr. Henry W. Thomas, resigned.

Mr. Louis Chevrillon, of Puebla, Mex., is now in this country placing contracts for machinery to be installed in the various mines in which he is interested.

Mr. Horace K. Devereaux, accompanied by his nephew, Mr. William G. Devereaux, is investigating the tin deposits of Lost River, near Nome, Alaska.

Mr. F. P. Thorp, who has been representing the Power & Mining Machinery Co., at Boston, Mass., is now in charge of the Pittsburg office of that company.

Mr. Robert J. Coleman has returned from the Lluvia de Oro mines in western Chihuahua, Mex., and will spend the next two weeks in New York and Boston.

Mr. W. F. M. Goss, dean of the Schools of Engineering of Purdue University, has received the honorary degree of Doctor of Engineering from the University of Illinois.

Mr. T. Lane Carter, correspondent of this JOURNAL at Johannesburg, and a special contributor, has left the Transvaal on a four months' engagement in northern Rhodesia.

Mr. W. R. Ingalls, mining and metallurgical engineer, has discontinued his office at 4 Liberty Square, Boston, and is now to be addressed only at 52 Broadway, New York.

Mr. J. D. Hawkins, general superintendent of the properties of the United States Reduction & Refining Co. in Colorado, has been inspecting the property of the Utah Copper Co. at Bingham.

Mr. M. J. Goodenough, secretary and treasurer of the Exposed Treasure Mining Co., of New York, is at present at Mojave, Cal., inspecting the company's mines and works at that place.

Mr. H. A. Barker, formerly metallurgist to the Free Gold Mining Co., operating the Golden Cross mines at Hedges, Cal., has been appointed receiver of these mines, in place of Mr. Chas. W. Pauly, resigned.

Mr. C. S. Verrill, of New Haven, Conn., has finished an engagement with the Mountain Lion Gate Mining Co., and is going to Alaska to examine properties near Juneau for the Helvetia Gold Mining & Milling Co., of Seattle.

Mr. Robert McF. Doble, of San Francisco, consulting and supervising engineer, making a specialty of hydro-electric power developments and long-distance power transmission, announces that he has become identified with the Abner Doble Co., manufacturing tangential water wheels.

Mr. H. B. Claussen, for 25 years with the mining machinery department of the Allis-Chalmers Co., of Chicago, has been appointed master mechanic of the Osceola Consolidated mines, Michigan, succeeding Mr. Alexander G. Andrew, resigned, the new superintendent of the Centennial mill.

Mr. A. B. E. Hodges, superintendent of the Granby smelter at Grand Forks, B. C., has been appointed general superintendent of the Granby properties, and will have charge of both the smelter at Grand Forks, B. C., and the mines at Phoenix, B. C. Mr. W. Y. Williams, the present superintendent of the mines at Phoenix, has been appointed consulting mining engineer.

OBITUARY.

E. W. Perry, a pioneer gold miner of '49, in California, died in New York on June 5, aged 70 years.

Walter T. Avery died on June 10 at East Moriches, N. Y., aged 90 years. He graduated from Columbia College in 1836, and was one of the gold seekers who went to California in 1849.

Nicholas Schulz, one of the oldest gold and silver leaf manufacturers in the country, died at Glen Ridge, N. J., June 10. Mr. Schulz established his business in 1857 in New York City. He amassed a fortune and retired from business in 1903.

Col. H. A. Stearns, once governor of Massachusetts, died at Chihuahua, Mexico, recently. He went to Mexico 46 years ago, and accumulated a fortune in mining there. He was associated with the late Alexander R. Shepherd in mining enterprises.

John Munhall, of Pittsburg, one of the original members of the United States Steel Corporation, died at Atlantic City, N. J., on June 9, at the age of 71, after a surgical operation. Mr. Munhall was the founder of the town of Munhall, Pa., and the owner of the big steel works there. He was associated with Andrew Carnegie and Charles M. Schwab in the formation of the Steel Corporation. He had been ill for about five months.

SOCIETIES AND TECHNICAL SCHOOLS.

RENSSELAER POLYTECHNIC INSTITUTE.—The main building at this institution, Troy, N. Y., was completely destroyed by fire on June 10. The flames left nothing intact but the walls. The loss is placed at $100,000 and the insurance at $53,000.

COLUMBIA UNIVERSITY.—The Marcus Daly scholarship of $1,000 has been established by Mrs. Gerard, wife of James W. Gerard, of the class of 1890, in memory of her father, Marcus Daly. The scholarship is open only to one who has worked in the mines or who is the descendant of a miner in the State of Montana.

Adolph Lewisohn, of New York, has given $250,000 to the university to enable it to build and equip a School of Mines building.

SUMMER SCHOOL OF MINING.—The joint summer school of mining of Columbia University, the Boston Institute of Technology, the Lawrence Scientific School of Harvard, the Sheffield Scientific School of Yale, and the Colorado State School of Mines, began its session at Georgetown, Colo., on June 11. The school will cover a course of 10 weeks in practical mining work in all its branches. Each institution represented will have a corps of instructors with its students, making about 100 students and instructors in attendance.

INDUSTRIAL.

The Rand Drill Co., of New York City, has secured a contract from the Safe Investment Gold Mining Co., for an air compressor and several rock drills of the Slugger type.

The Hendrick Mfg. Co., of Carbondale, Pa., manufacturer of perforated sheet metals, has opened a New York office in the Singer building, 149 Broadway, with C. J. Thompson as resident manager.

The Pennsylvania Steel Co. will build an addition to its bridge and construction shops, 160 ft. long and the width of the present plant, at Steelton, Pa. The construction work will be of brick and steel, with stone foundations.

The firm of Carpenter & Carpenter, metallurgical engineers, has completed some tests with the Blake electrical separator. A 40-day test in Nevada and a 22-day test in the Lake Superior copper region, showed excellent results on copper ores.

At the plant of the William B. Pollock Co., Youngstown, O., builders of steel plate construction, a modern hydraulic flanging plant of the largest size has been installed. This additional equipment enables the company to bend and form the heaviest sections of structural material as well as flange and bend plates up to 2½ inches thick.

The Colorado Iron Works Co. has closed contracts for several mills to be erected in Idaho. One of these, in the Big Creek district, is for the Wordenhoff Mining & Milling Co., and consists of a complete 30-stamp amalgamation mill, with cyanide plant. This will include both water and steam power. A complete 15-stamp amalgamation mill for the Thunder Mountain Climax Gold Mining Co. will be constructed by the same company. One of the largest modern lead smelting furnaces installed in southeastern Missouri has been shipped to the St. Joe Lead Company.

The Abner Doble Co., of San Francisco, Cal., manufacturers of tangential water wheels with needle regulating nozzles, dealing in and manufacturing iron, steel and metals, announces the organization of its consulting engineering department, in charge of Mr. Robert McF. Doble, who has had considerable experience in the design, construction and operation of high head hydro-electric power plants and long distance power transmissions. The Abner Doble Co. is also now prepared to take entire charge of the design and construction of power plants, pumping plants and other engineering work, guaranteeing maximum economy and efficiency in construction and in operation.

TRADE CATALOGUES.

A convenient size, 123-page price list of wire cloth, nettings, fencings, perforated metals, etc., has been issued by the Clinton Wire Cloth Co., of New York. The list contains a variety of this line of goods, with prices per square foot.

From the Chicago Pneumatic Tool Co., of Chicago, Ill., we have received No. 3 of its monthly magazine entitled 'Something Pneumatic.' It contains descriptions of the pneumatic tools made by the company, with illustrations.

The F. W. Braun Co., of Los Angeles, Cal., has issued a vest pocket booklet in which are incorporated numerous facts bearing on the effeet of heat on metals, and also telling of the advantages of Braun's portable forge and tempering furnaces.

The Stromberg-Carlson Telephone Manufacturing Co., of Rochester, N. Y., in its bulletin No. II, entitled 'Telephones,' describes the variety of telephones and their parts manufactured by it. The book is well provided with illustrative cuts.

The Indianapolis Switch & Frog Co., of Springfield, O., is sending out an artistic booklet concerning light rail frogs and switches, and stands for mines, quarries, industrials and miniature railway tracks; also a 4-page folder descriptive of general track work.

The Austin Manufacturing Co., of Chicago, Ill., is sending out its latest catalogue illustrating and describing its full line of sweepers, sprinklers, pavement scrapers, dump carts, rock and ore crushers, steam pumps, quarry drills and earth handling machinery. This catalogue will be furnished on request.

The Joseph Dixon Crucible Co., of Jersey City, N. J., is sending out a tasteful little booklet, describing the uses and advantages of graphite as a lubricant for engines. It is illustrated by well-executed cuts. The company

is also using a large postal card to draw particular attention to its graphite axle grease.

The Denver Ore Testing & Sampling Co., of Denver, Colo., has issued a 16-page booklet, setting forth the object of the company, which is to ascertain the type of machinery best adapted to any particular ore. The company's plant includes the most modern concentrating machinery with which to experiment in this line. Prices for assays and analytical work are included.

The Niles-Bement-Pond Co., of New York, is issuing a most creditable publication in the *Progress Reporter*, which is sent out monthly, and is devoted to the more important machinery which the company manufactures. The publication deserves more than a passing glance, owing to the excellent and artistic manner of its general make-up, and should be had by every user of heavy machinery.

GENERAL MINING NEWS.

ALASKA.

Alaska Tin Mining Co.—By decree of the United States District Court, the appointment of a receiver for this Delaware corporation by the Delaware court has been confirmed. The action is brought by Mrs. Lydia R. Clements, of Brookline, Mass., to prevent the transfer of this company's claims to the Alaska Tin Mines Co., Ltd., a Rhode Island corporation.

Kasaan Bay Mining Co.—This property, which was sold in order to protect the bondholders, has been bought by C. D. Carrol. The sale is practically the final wind-up of the stockholders' interest in the company. The property brought $25,000 above the bondholders' claim, which was for $71,000. This makes the total amount received for the property $96,000.

ARIZONA.

MARICOPA COUNTY.

Pittsburg Group.—A rich strike of gold on this group of three claims, ten miles east of Wickenburg, is reported. The group is owned by George F. White.

MOHAVE COUNTY.

(*From Our Special Correspondent.*)

Ben Harrison.—The discovery of rich gold ore in this mine at Acme is reported on the 200-ft. level. Eli Hilty, of Kingman, is the owner.

Enterprise.—The time option upon this mine at Wallapai has been surrendered to its original owners. The ores are of too low grade silver to be profitable without suitable reduction works on the ground.

Great West.—The indebtedness on this property, in Minnesota district, has been paid off. Four 25-ton cyaniding tanks have been erected.

Jacobson.—This mine, at Gold Basin, has a 25-ton cyaniding plant in successful operation.

Keystone.—At this mine, at Mineral Park, a new steam hoist is in operation.

Lookout Extension.—Good shipping gold ore near the surface, is reported at this mine, owned by McKesson Bros.

Samoa.—At this mine, near Chloride, the drift on the 275-ft. level is under cover about 600 ft. Four carloads of ore are shipped monthly.

Virginia.—The 10-stamp mill of this mine in Weaver gold district is running successfully. Blakely & Kenny have a lease of the property.

YAVAPAI COUNTY.

Hackberry.—Fire in this mine in the Big Bug district on June 2 destroyed the hoisting plant.

CALIFORNIA.

AMADOR COUNTY.

Central Eureka Mining Co.—It is reported that the clean-up of this mine, between Jackson and Sutter creek, for May was about $35,000. This is more than in any preceding month. The ore came mostly from the lowest levels.

Defender Mining Co.—At this property, at Defender, a large body of ore is in sight on the 300-ft. level.

Grand Prize.—Geo. S. Andrews is about to unwater this property and repair the tunnels.

BUTTE COUNTY.

Bangor Consolidated Mining Co.—This new company has its principal place of business at Phoenix, Ariz., and properties at Bangor, about 13 miles from Oroville. The principal mine is the old Catskill in the Blue Lead region. It is expected that the company will run a 3-mile tunnel from Kentucky ranch, 10 miles from Oroville, to tap the channel. The mine will be worked by drifting.

CALAVERAS COUNTY.

Boston.—The old mine at Mokelumne Hill, at one time a paying property, is to be reopened.

Jenny Lind Dredge.—This dredger, on the Calaveras river, is at work steadily. It is extracting about 30% more than the drill samplings showed.

Spinola.—This gravel mine at Central Hill has been bonded to San Francisco men.

EL DORADO COUNTY.

Boncsct.—A mill is being erected at this mine, owned by the El Dorado Exploration Company.

Gopher-Bowlder.—At this property at Kelsey, W. A. Bell, owner, and John Sipp superintendent, a large force is getting out ore from the Gopher. The mill has been repaired and sinking will be continued below the old workings.

Jasper.—High grade ore is coming from the 120-ft. level of this mine.

Mammoth.—Five stamps have been added to the new mill at this mine, near Jurgens. W. T. Shurtleff is superintendent.

Old Gregory.—This mine, near Smith flat, owned by N. L. Kohn & Co., of Placerville, is producing gravel worth from $5 to $10 per carload.

INYO COUNTY.

Death Valley.—The gold quartz discoveries 15 miles northeast of Furnace creek ranch, are reported very promising. The mines lie on the western slope of the Funeral range.

KERN COUNTY.

Star.—A roller mill and concentrator have been put on this mine in Democrat district by those who hold the bond and privilege of purchase.

NAPA COUNTY.

Silverado.—Robert Grigsby & Son may reopen this old mine on Mt. St. Helena. Some years ago the mine yielded largely in silver.

NEVADA COUNTY.

Canfield.—At this mine, Blue Tent, the air compressing plant is to be enlarged.

Federal Loan.—At this mine, near Nevada City, L. A. Sutherland, the new superintendent, is reorganizing affairs and putting the machinery in shape.

Omega.—The dam constructed on this gravel mine at Omega was not satisfactory to the California Debris Commissioners, and they declined to accept it. A concrete dam is planned, but this season's work has been practically lost.

Shady Creek Dredging Co.—At the property of this company, near the old Cherokee diggings, Bridgeport township, the centrifugal pump is elevating the gravel 32 ft. It is planned to put in a much larger pump. The gravel is said to go 30c. per yard.

Spanish Ridge.—At this mine E. Egan superintendent, the number of stamps is to be doubled.

Zeibright.—Air compressors and drills are to be put in this mine, F. Zeitler, superintendent.

PLACER COUNTY.

Dairy Farm.—At this property on Bear river, 10 miles north of Lincoln, a Chile mill is used to crush the ore, which carries both gold and copper. The copper ore is hauled to Sheridan by teams and then shipped to the Peyton Chemical Works, near Martinez. A small railroad is planned to connect with the Southern Pacific main line at Lincoln, Sheridan or Wheatland. A. E. Vanderdock is vice-president of the company and F. H. Peyton, secretary.

Holmes Lime Co.—This company, operating on Bear river, has shipped its first consignment of lime from the recently opened quarries, to the North Star mines, Grass valley.

RIVERSIDE COUNTY.

Bismuth.—A bismuth mine, near Banning, is being opened and 25 tons will be shipped to New York.

Lost Horse.—This mine, at Banning, which has been closed down for some years, is to be reopened.

Temescal Tin Mines.—This property has been leased for twenty years to the United States Tin Mining Co., of Los Angeles, of which H. A. Schinnerer is president and F. J. Schinnerer secretary and treasurer. Considerable machinery has been sent in to work the tailings. High grade tin ore is reported. Geo. Leonard, of Pasadena, is general manager.

SACRAMENTO COUNTY.

Ashburton Mining Co.—The new dredge of this company at Sailor Bar, built to replace the one burned last year, is almost completed.

SAN DIEGO COUNTY.

Noble Mines, Ltd.—This company, near Descanso, is increasing its milling capacity to 120 tons daily, and will put in two 10-ft. Lane, slow speed mills and a 20-h. p. gasoline engine. Two 10-ft. mills have been contracted for. J. A. Wauchope is manager of the company. About 5,000 tons of ore have thus far been milled.

SANTA CLARA COUNTY.

San Juan Quicksilver Mining Co.—This newly organized company has purchased various tracts of land adjoining its Santa Teresa grant, south of San José, and is actively mining. The company is controlled by the same parties, with R. B. Harper as manager. The principal stockholders are: Ward B. Holloway, of Brookline, Mass.; John Joyce, of Andover, Mass.; James R. Powers, of Boston; Edwin Stone, of Biddeford, Me., and Melville Woodman, of Biddeford, Me.

SHASTA COUNTY.

Bully Hill Mining Co.—This company, at Delamar, is to put in heavier hoists, and connect the mine sand smelter with a tramway.

Gambrinus.—This mine at Whiskytown is to have a new milling plant and will be extensively developed by its owner, A. J. Glass.

Mammoth.—Mrs. Desda Wallace has sold her third interest in this mine to J. Fillius and F. G. King, who now hold a bond on this entire property. It is expected that a copper smelter will shortly be put on the mine.

SISKIYOU COUNTY.

Advance.—This and other ledges in the Salmon river section are to be actively developed by A. C. Brokaw, who is putting a mill on a ledge of Hull gulch, near Oro Fino.

Golden Eagle.—The new mill at this mine, Indian Creek, is now ready for operation.

Quigley.—This mine near Oak Bar is being operated successfully by Mapleson Bros. & Hammer.

Winthrop.—At this mine on Taylor creek, arastras are being built.

Yreka Mining & Milling Co.—This property in the Salmon river region at Rollin, is idle owing to litigation.

TRINITY COUNTY.

Yellowstone.—At this group, on East fork, the ledge has been struck in the tunnel, being run under the old pay shoot. The ledge where found is narrow but rich. Robert Skinner is superintendent for Mark Manley.

TUOLUMNE COUNTY.

El Rico Mining Co.—The 20-stamp mill of this company, near Tuttletown, has been completed. The shaft is 630 ft. deep and the vein is about 40 ft. wide. The mining and milling cost is expected not to exceed $1.50 per ton.

Free Lance.—The recently discovered ore body is reported improving in size and value as depth is attained.

Santa Ysabel.—The new double geared hoist is in operation. The shaft is down 450 ft.

COLORADO.

CLEAR CREEK COUNTY.

Saratoga.—The closing of the deal between this company, of Idaho Springs, and the Newhouse tunnel management has been announced. John Owen and C. W. Morgan, of Idaho Springs, are the owners of the Saratoga property.

Stanley.—After years of litigation this property, at Clear Creek, is to be put in operation again. The mine was worked for 20 years without interruption, and is said to have produced $3,000,000. A. G. Brownlow is the present owner.

DOUGLAS COUNTY.

Sedalia.—A 100-ton concentrating mill is to be erected at this copper mine, near Sedalia.

FREMONT COUNTY.

Colorado Fuel & Iron Co.—Electric mining machinery is to be installed in this company's coal mine No. 5.

Murphy Mining Co.—At the mine of this company in the Silver Cliff district, a new mill is to be erected.

GILPIN COUNTY.

(From Our Special Correspondent.)

Bertha Gold Mining & Milling Co.—At the annual meeting at Idaho Springs it was decided to sell all the properties to the highest bidder on July 16. The property consists of 21 lodes most of which are patented, in Gilpin and Clear Creek counties, a concentrating mill at Idaho Springs, machinery and office buildings. For the past year or so there has been a bitter contest among the stockholders. T. J. McClanahan, president, and Dr. Striffleris, secretary, both reside at Booneville, Mo.

Black Hills & Denver Consolidated Co.—This company has bought from M. H. French and others the Last Dollar group of seven claims and the Phoenix placer claim in Phoenix district for $5,000.

Chemung-Belmont.—Eastern parties have bonded this group as the Central Bonding Co. from the Black Hawk owners, and after repairing the main shaft 620 ft. deep are ready to sink 200 ft. and drift at the bottom workings. The property is credited with a production of over $250,000, the mill ores ranging between 2 and 3.5 oz. gold to the ton. N. G. Mitchell, Black Hawk, is superintendent.

Eldorado Mining Co.—Eastern and Colorado men are interested in the incorporation of this company with a capital stock of $1,000,000 S. T. Harris, H. P. Lowe, J. O. Reagan and Henry Marucchi, incorporators, have taken hold of the Eldorado group and the Delaware mill site. S. T. Harris, Russell Gulch, is superintendent.

German.—This property on Quartz hill is to be worked under a bond by men who will install machinery and erect top buildings. The main shaft is reported to be 400 ft. deep.

Hawley-Gardner.—At this property on Quartz hill, the machinery and buildings are being overhauled and it is the intention of the pool to crosscut and drift at a depth of 700 ft., or near the bottom. W. Nicholas is superintendent.

Lutz.—This property has been leased by G. K. Kimball, Jr., of Idaho Springs, and F. A. Scheuber, of Livingston, Mont. The plant is being overhauled and the 600-ft. shaft will be retimbered. The product is chiefly a concentrating ore, and a considerable tonnage is ready for shipping.

GUNNISON COUNTY.

Corona Gold Mining Co.—On this company's property at Bowerman, a vein 2 ft. wide, carrying gold, is reported encountered on the Omy lode on Copper mountain. It was cut in the tunnel at 112 ft. from the portal.

OURAY COUNTY.

Governor.—A strike of rich gold is reported at this mine at Ouray.

Revenue.—Preparations are being made for active operations at this mine at Ouray this summer.

SUMMIT COUNTY.

Gold Run Mining & Milling Co.—At this mine, near Breckenridge, a tunnel and a lateral, in about 1,000 ft., are being driven to develop a group of about 50 lode claims near the head of Gold Run gulch. Pennsylvania and Colorado capital is interested. The tunnel is expected to cut a known vein at about 3,000 ft.

Old Union.—The vein at this mine, near Breckenridge, is reported to show a 3-ft. paystreak.

(From Our Special Correspondent.)

Masontown Mining & Milling Co.—This company started its mill at Frisco on June 1. There is a 20-stamp mill and a cyanide plant with drying and smelting furnaces and all accessories. David H. Lawrence, of Denver and Australia, is superintendent of the plant and also consulting engineer for the company. The ore is furnished by the company's mines. A. E. Keables is general manager, and the other officers are J. V. Hoover, of Masontown, Pa., president, and S. R. Provins, of Greensboro, Pa., treasurer.

TELLER COUNTY—CRIPPLE CREEK.

(From Our Special Correspondent.)

Mining in the district during the week has been practically at a standstill owing to the excitement following the dynamite outrage at Independence. A few of the leases have been worked a few days and one or two of the big mines have done some work. Several hundred men have been arrested. The union halls in the district are in possession of the authorities and the union stores have been closed. On June 8 a special train run to Dunville, the new camp, carried about 100 armed citizens and militia under the command of General Bell, and after a sharp skirmish 19 men were captured and one killed. The prisoners were brought to the district and put in the bull pen. Armed parties have thoroughly scoured the district and all men belonging to the union not known to be good citizens are brought in and put in jail. A committee has been appointed to investigate all arrests and undesirable characters, with the exception of those known to be guilty of some offense, are to be deported. The criminals are to be kept in jail and tried in the courts. About 110 men have so far been deported and probably 100 more will go. The sheriff's office has been working on strong clues that promise to fasten the blame on some of the officers of the Western Federation of Miners. The citizens are determined to exterminate the Federation in this camp root and branch, and the outlook is good for a peaceable and law-abiding community.

IDAHO.

FLATHEAD COUNTY.

Yahk River District.—A placer mine stampede in this section, which is in the extreme northwestern part of the county, is reported. A company has been organized at Sand Point to work ground supposed to contain gold.

OWYHEE COUNTY.

Eureka Mining Co.—This company, operating on the Snake river, has elected the following officers: President, O. E. Guernsey, Dubuque, Ia.; vice-president, C. O. Howard, Waukon, Ida.; secretary, G. A. Nehrood, Lewiston, Ida.; treasurer, H. W. Newton, Lewiston, Ida. The company has 30 claims and may erect a smelter.

SHOSHONE COUNTY.

Douglas.—Ore taken from a recent strike on this property in the Pine creek district is reported to have assayed 73 per cent lead, with a trace of silver.

Gold Hunter.—After a close down of six months at this mine, at Mullan, the mill has commenced grinding again. About 30 men are now employed.

Hercules.—Judge Morgan has denied the motion of the Ambergris Mining Co. to reopen its case against the owners of this mine, at Wallace, and signed a decree in favor of the defendants. The suit is one of adverse of patent.

Senator Stewart.—At this lead-silver mine, near Government gulch, which has recently begun shipping ore, a Cornish jig to handle the second class and lower grade ore, has been installed.

(From Our Special Correspondent.)

Hercules.—This mine, near Burke, perhaps to-day the best property in the Cœur d'Alene district, is planning for a concentrator with a capacity of 400 to 500 tons a day. Harry Day, the manager, has been negotiating with the Northern Pacific railway for a spur 1,000 ft. long up the cañon from Burke, to connect with a proposed tramway a mile long from the mine. The electric plant at the mine is complete.

ILLINOIS.

SANGAMON COUNTY.

(From Our Special Correspondent.)

R. C. Solomon, of Springfield, Ill., has just begun to open a mine at Auburn on the Chicago & Alton Railway. Mr. Solomon was a member of the firm of Solomon & Moore, which operated the Black Diamond mine, south of Springfield, that was sold to the Springfield Coal Mining Co. a year and a half ago.

Athens Mining Co.—This company, at Athens, is putting in electric haulage. The Goodman Manufacturing Co., of Chicago, is furnishing the plant.

Consolidated Coal Co.—Suit has been brought in the county circuit court by this consolidated company of St. Louis, against the Jones & Adams Co., of Springfield, Ill., for $30,000 damages for non-fulfillment of contract to furnish coal from July 1, 1902, to March 31, 1903. The contract was for daily shipments of a minimum of 125 tons and a maximum of 200 tons at the option of the purchaser (the Consolidated Coal Co.) The judge ruled that the case could only be tried for 125 tons per day, as the other 75 tons per day was an option for future delivery, and hence invalid under the gambling laws of Illinois. He later instructed the jury to find for the defendant, on the ground that the question as to who should furnish railroad cars was not mentioned in the contract, and hence it was the duty of the purchaser to furnish them, and the latter had not done or tried to do so, when cars were scarce.

Springfield Coal Mining Co.—This company has closed its No. 5 mine south of Springfield, for repairs.

West End Coal Co.—This company, of Springfield, is putting in a Goodman Manufacturing Co. electric haulage plant.

VERMILION COUNTY.

Jones & Adams Co.—This company has resumed work at its No. 2 mine at Catlin, after two months' shutdown, for improvements and repairs.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

(From Our Special Correspondent.)

Baltic.—This mine produced 744 tons of mineral in May.

Calumet & Hecla.—A third exploratory shaft to open the Kearsarge amygdaloid lode has been started on section 23, some 200 ft. from the line of the Osceola, and on the extreme southeastern edge of this property. The May production is estimated at 3,225 tons of refined copper.

Champion.—The production in May was 784 tons of mineral. The boilers for the new compressor plant have been installed and the 100-drill compressor will go into commission in a few days. This will permit the operation of the fourth head and an increase of 25 per cent in output.

Franklin.—The May production was 386 tons of mineral.

Isle Royale.—This mine's May production is estimated at 85 tons of refined copper.

Michigan Smelting Co.—Two furnaces are in blast. They will treat Trimountain mineral exclusively until July 1, when the other furnaces will be blown in and mineral from the Mohawk, Wolverine, Atlantic, Baltic and Champion mines will be smelted.

Osceola Consolidated.—The May output was approximately 925 tons of refined copper. The North and South Kearsarge branches are furnishing 75% of the output. A crosscut may be extended 2,750 ft. east from one of the shafts at the old Osceola to cut the Kearsarge amygdaloid.

COPPER—KEWEENAW COUNTY.

(*From Our Special Correspondent.*)

Ahmeek.—Rock shipments to the Tamarack mill are irregular, but average 80 tons daily. It is understood that the rock is yielding 1.25% refined copper.

Phoenix Consolidated.—The production in May was 108 tons of mineral.

COPPER—ONTONAGON COUNTY.

(*From Our Special Correspondent.*)

Adventure Consolidated.—The production in May is estimated at 62.5 tons of refined copper.

Mass Consolidated.—The May output was about 92.5 tons of refined copper.

Michigan.—This mine produced 164.75 tons of mineral in May, the largest monthly yield since stamping with one leased head at the Mass mill begin. The yield per ton of rock is reported satisfactory. Development work continues on a liberal scale.

MONTANA.

FERGUS COUNTY.

Barnes-King.—The gross earnings of this group of mines is said to average about $40,000 a month. The main working claim is developed to a depth between 500 and 600 ft., and is producing ore at the rate of nearly 200 tons a day.

JEFFERSON COUNTY.

Cataract Copper Mining Co.—The smelter of this company in the Cataract district, 11 miles from Basin will, it is said, be started at once. The plant has a capacity of about 150 tons of ore per day, and when in commission will be operated under the supervision of O. Bergstrom.

Galena.—At this mine at Silver Star, the works have been carried to a depth of 200 ft. and drifting and stoping are being done.

Galena-Gulch.—The mine north of Boulder, owned by William Sall, has been leased to Herman Mattern & Sons, of San Francisco, for $10,000. The company will install machinery and work during the summer.

LEWIS AND CLARKE COUNTY.

Empire.—This group of gold claims is reported sold by Owen Byrnes, of Helena and E. A. Wetmore, of Marysville, to Edwin Morris and W. L. Leech, of Fargo, N. D., for $100,000. The property is three miles from Marysville and 20 miles from Helena.

I. H. Morrison.—This mine, at Rimini, is reported to be producing a good grade of silver-lead ore.

Inter-Ocean.—The tunnel into Red Mountain at this mine at Rimini, is now in about 300 ft., and is progressing at the rate of 5 ft. a day.

(*From Our Special Correspondent.*)

Gold Cord Mining Co.—This company has filed its articles of incorporation with the Secretary of State and has taken over by purchase the Empire group, comprising 190 acres of mining ground, the 60-stamp mill and the 500-ton cyanide plant built to work the tailings impounded years ago from the stamp mill. These tailings amount to about 200,000 tons and are claimed to have an average value of $3.08 per ton. The management claims that the cyanide plant is saving 80% of the values in the tailings at a total operating cost of 30c. per ton. The property is at the old camp of Empire, four miles west of Marysville. The mines are opened up by a cross-cut tunnel 2,600 ft. long, with several thousand feet of lateral workings on the veins. This development was done 12 to 14 years ago by an English company that operated the property and built the 60-stamp mill. Ten years ago this company disposed of the property. The cyanide plant was built three years ago after a long period of investigation, it being the intention to clean up the accumulation of tailings on hand before starting the 60-stamp mill again. The present company is capitalized at $2,500,000, with W. F. Leech, of Fargo, N. D., president; Edwin Morris, of Fargo, N. D., vice-president; J. L. Malm, of Cleveland, O., secretary, and E. A. Wetmore, of Helena, treasurer. These, with O. M. Lanstrum, J. H. McCabe, of Montana, and W. H. Dawson, of Chicago, are the directors. The sum of $100,000 is to be set aside as a fund to bring the mines to such a state of development as to insure a regular ore supply for the stamp mill.

SILVERBOW COUNTY.

Bull Run.—The showings on this claim, near Walkerville, lead prospectors to believe that large copper deposits are there.

Jessie.—This mine, near Butte, is being worked by the Largey estate.

NEW MEXICO.

GRANT COUNTY.

Chatham Copper Co.—A new smelter has been blown in on the company's property at Silver City. Ben Johnson is owner and manager.

Santa Rita.—A body of copper ore is reported by G. M. Castillo on his lease, at the No. 7 shaft of this company, near Silver City.

SOCORRO COUNTY.

Mogollon Gold & Copper Co.—A strike of rich bornite is reported on this company's property at Mogollon.

OREGON.

BAKER COUNTY.

Cougar.—A bond has been taken on this mine, 12 miles from Sumpter, by W. H. Plummer. The bonding price is given at $600,000. The property has a 250-ton cyanide plant and 200 ft. of development work. It is owned by the Cougar Gold Mining & Milling Company.

COLUMBIA COUNTY.

Mt. St. Helens Consolidated Mining Co.—A strike of high-grade ore in a new property, in the St. Helens district, controlled by this company, is reported.

JOSEPHINE COUNTY.

Golden Wedge.—This mine, near Galice creek, has been sold for $15,000 to Wilmington, Del., people. The values are said to carry nearly $40 per ton in gold. The new owners intend to install a large plant.

Kirkland Placer Mines.—These mines, near Leland, are reported sold to McNicholas Brothers, of Portland, and to Chicago people. The property has produced in a small way for the last ten years.

LANE COUNTY.

Great Northern.—The output of a six days' run of the 2-stamp mill on this mine in the Blue River district is reported to have been 46 oz. gold bullion.

Oregon Blue Mining Co.—An Allis-Chalmers 10-stamp mill is being installed at this mine. The property was formerly known as the Badger.

PENNSYLVANIA.

ANTHRACITE COAL.

Lehigh & Wilkesbarre Coal Co.—The breaker of this company, at Audenreid, was completely destroyed by fire on June 8. Eight hundred men and boys are thrown out of employment. The loss will amount to $100,000, partly covered by insurance. The fire was caused by the explosion of a can of oil while repairs were being made to machinery.

McMichael Coal Co.—This company, which has been prospecting in the vicinity of Jerseytown, Columbia county, for a year past, is reported to have found a vein of good coal.

National.—This colliery, at Scranton, owned by William Connell & Co., is reported closed for an indefinite period and 400 men are out of employment. The trouble is over a demand of the men for an increase of wages because, they say, the mine is harder to work than others.

New York, Ontario & Western.—On account of the destruction of several of its breakers, this company finds trouble in filling its contracts and has begun mining again at the Pine Brook colliery.

People's Coal Co.—This company, which operates the Oxford colliery at Scranton, is preparing to build an addition to the present breaker. In the addition a washery will be placed.

Pennsylvania Coal & Coke Co.—This company has resumed operations at its Hastings coal and coke plant, known as the Mitchell mines.

Philadelphia & Reading Railway Co.—It is announced that this company will soon begin the construction of a great coal storage plant near Abrams Station, on the main line, just above Bridgeport. The proposed plant will have a capacity of 500,000 tons.

BITUMINOUS COAL.

Kingston Coal Co.—The engine house and boiler room of this mine, near Courtdale, was burned on June 8. About 100 men and boys are thrown out of employment. The loss amounts to several thousand dollars.

Pittsburg Coal Co.—This company has sued J. V. H. Cook & Sons to recover $18,822.88, alleged to be due on a sale of the Allison mine to the coal company for $125,000. It is alleged a deficit exists between the survey and the description of the property and the plaintiff says it has overpaid $17,705 on the deal.

SOUTH DAKOTA.

CUSTER COUNTY.

(*From Our Special Correspondent.*)

Extreme Gold Mining Co.—A test run was recently made on 200 tons of ore from this mine.

Golden Banner.—Considerable work is being done at this mine, eight miles northwest of Custer.

May.—A discovery of ore is reported on this property on Lightning creek, 13 miles west of Custer, at a depth of 25 ft. M. A. Willis, of Custer, is general manager.

Saginaw Mining Co.—This company owns 317 acres of ground eight miles northwest of Custer. A considerable amount of development work has been done on three parallel veins.

LAWRENCE COUNTY.

(*From Our Special Correspondent.*)

Damage by Floods.—Much damage has been done in this county to mines and other property by a three days' rain. The mines have had to close, and most of the mills are idle owing to lack of ore and fuel. The narrow gauge railroads to Bald mountain is greatly damaged. The Homestake mines were flooded, and for 24 hours the mills were forced to close. It is estimated that the damage done to the Northwestern and Burlington railroad companies and to mining and private properties will be $500,000. Four men were drowned in the flood.

Gild Edge Maid.—A new 100-ton cyanide plant will be installed at this mine.

Golden Crest.—A drift has been started on the 200-ft. level in this mine. A large brick was brought to Deadwood from a two weeks' run in the mill.

PENNINGTON COUNTY.

Golden Empire.—Control of the stock in this mine has been sold to E. T. Merritt, of Duluth. Extensive development work will be carried on. The company has been working the Golden Slipper mine 4 miles east of Hill city, with a 5-stamp mill.

UTAH.

(*From Our Special Correspondent.*)

Ore and Bullion Settlements.—Salt Lake banks reported settlements for the week ending June 10 of $421,600.

BEAVER COUNTY.

Newhouse Mines & Smelters Corporation.—The management at Salt Lake has closed a contract for 40 Wilfley concentrating tables, also 16 slimers for the new mill for the ores of the Cactus mine. Grading the roadbed for the 2-mile track between the mine and mill site will begin in a few days.

Wild Bill.—This well-known group of claims has been incorporated as the Chicago Mining & Milling Co. with a capital of 150,000 shares, par value $1. The incorporators are Thomas Keeley, Chicago, president; Mathew Cullen, Salt Lake, vice-president, and Fred T. McGurrin, Salt Lake, secretary.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Ore Shipments.—During the week ending June 10, 115 carloads were sent to the Salt Lake smelters, as follows: South Swansea, 4; LaClede, 1; Brown, 1; Centennial-Eureka, 43; Uncle Sam Consolidated, 1; Victor Consolidated, 1; Ajax, 5; Mammoth, 11; Grand Central, 24; Carisa, 3; Bullion-Beck, 3; Gemini, 18.

Uncle Sam Consolidated.—John Dern, of Salt Lake, has been elected president and general manager. The annual report showed a balance on hand of a little over $8,000. During the year about $63,000 was received from the sale of concentrates. Between $15,000 and $16,000 was expended in the construction of a concentrating mill.

MILLARD COUNTY.

(From Our Special Correspondent.)

Oasis Gold & Copper Co.—What seems an important showing of ore is reported. A mill is talked of for this year. J. D. Clive, Salt Lake, is manager.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Alta-Quincy.—This property is to be equipped with machine drills. Power will be obtained from the Columbus Consolidated compressor plant.

Bingham Consolidated.—The shipments of copper bullion aggregated about 245,000 lb. in the week ending June 11.

Columbus Consolidated.—The machinery for the 100-ton mill to be built at Alta is being delivered. The management expects to have the plant running within 60 days.

Kennebec.—This mine, which includes some of the early day producers at Alta, is to be equipped with an air compressor plant. W. J. Craig, of the Tintic Mining & Development Co., Salt Lake, is manager.

United States.—This company will enter the market for lead ores in about 60 days, but contracts are already being secured with producers. The lead smelter, now being constructed, will be ready for commission about September 1. The shipments of copper bullion during the week ending June 11 aggregated 252,926 lb.

Utah Consolidated.—The additions to the smelter will be soon completed and the management expects to blow in about June 20, when the company's mines at Bingham will be called on to supply 800 tons of ore daily, instead of 525 tons, as heretofore. The shipments of copper bullion during the week ending June 11 aggregated 303,909 lb.

Yampa Smelter.—This plant at Bingham, which was partly remodelled recently is in commission again.

TOOELE COUNTY.

(From Our Special Correspondent.)

Overland.—Good progress is made in altering the mill and preparing the mine for work. The property has been closed several years.

Bingham West Dip.—A complete air compressor plant will be delivered by a Salt Lake firm during the week. The tunnel, now 375 ft. in, is expected to cut Bingham ledges at a depth of 1,800 ft. below the present lowest workings of the Utah Consolidated.

WASHINGTON.

FERRY COUNTY.

Keller & Indiana Smelting Co.—A bill has passed Congress allowing this company to fell timber on Indian lands, build flumes and construct a smelter. Machinery for a sawmill is being installed at Keller, on the south half of the Colville reservation. New roads to the mines are under construction, and prospecting in several neighboring mines, idle for a long time, has been resumed.

Knob Hill.—Over 100 tons of ore were shipped to the Granby smelter the week ending June 4. Stoping will be pushed immediately to increase shipments.

Morning Glory.—A carload of rich ore was shipped a few days ago to the Tacoma smelter. Three men are employed.

Mountain Lion.—Experimental work continues at the mill, but no direct information of results can be obtained. It is reported that concentrating tables are to be installed for concentration of insoluble sulphides in the ore; that the free gold is dissolved by using a cyanide solution in the battery during stamp crushing, and what gold is left in the tailings is partly extracted in the cyaniding and agitating tanks; that the precipitation is effected by use of zinc shavings. It is further reported that a $5 per ton rate for freight to the smelters and treatment included has been obtained; that a contract has been closed for the shipment of 2,000 tons to the Granby smelter at Grand Fork, B. C., and that negotiations are pending for the delivery of 1,000 tons to the Greenwood, B. C., smelter. Experiments at the mill will be continued until the problem of treating the ore at the mill is solved; but it is probable that all ore assaying in bulk over $13 per ton will be sent to the smelters.

Park and Central.—The tunnel is in 700 ft. and has intersected the main vein, which is about 4 ft. wide, with quartz gangue carrying galena, gold and silver, the gold being of least value. A winze is being sunk on the vein from the end of the tunnel. Six men are employed, and the force will be increased immediately. Denis Clark is manager.

WHATCOM COUNTY.

Mammoth Gold Mining Co.—The 10-stamp mill on this property on Slate creek at Barron is about ready to start and about 35 men will be employed. A new rock crusher has been ordered to replace the broken one. The directors are Ray W. Jones of Minneapolis, E. B. Hawkins of Duluth, J. F. R. Foss of Minneapolis, Charles H. Ballard of Barron, Wash.; J. O. Calhoun of Seattle, E. C. Cooke of Minneapolis, R. R. Rand of Minneapolis. J. F. R. Foss of Minneapolis, is president of the company.

FOREIGN MINING NEWS.

CANADA.

BRITISH COLUMBIA—EAST KOOTENAY DISTRICT.

Sullivan Group Mining Co.—This company, owning a low grade silver-lead property near Marysville, has, it is said, made a deal with Charles Sweeny, of Spokane, whereby he takes the bond issue of $100,000 offered by the company to complete its smelter and put the property on an operating basis. Mr. Sweeny receives a bonus of 450,000 shares with the bonds, and in addition he has 1,000,000 shares put in escrow at 10c. for one year. He has been elected president, and E. J. Roberts, Bruce Clendenning, W. J. Hall and W. Clayton Miller, employees of his, are in the management. He expects to complete the smelter and start mining.

ONTARIO.

(From Our Special Correspondent.)

International Iron Co.—The Cole & McDonald Exploration Co., of Minnesota, has taken a considerable diamond drilling contract from the International Iron Co., which is exploring for iron on the south side of Hunter's Island, just north of Minnesota. Work is to begin at once and will continue all summer, at least. Present showings at the property are encouraging for the discovery of a deposit of iron ore of merchantable size and quality. If it proves to be a mine, this will be the first to be developed in that portion of the formation of that region.

MEXICO.

SONORA.

(From Our Special Correspondent.)

Sonora Mining Co.—This company, of Indianapolis, Ind., which has 700 acres of copper lands, has received word that the Mexican Supreme Court has handed down a decision confirming the company's ownership and dispossessing the Mexican contestants, who recently went so far as to ask for military forces to protect their alleged rights to the property. The company was organized by Indiana men several years ago, and the property was purchased at a low figure. The men prominent in the company are H. P. Wasson, E. L. Cotherel, H. G. McGowan, H. S. New, Henry Jamison, S. E. Morss, W. H. Smith, John McCarthy and Crawford Fairbanks.

MINING STOCKS.

(Full quotations given on pages 989 and 990.)

New York, June 15.

Wall street has struck an unusually quiet season, and in most directions brokers are curtailing expenses in anticipation of continued dullness during the summer. Stocks are heavy, brokers finding it impossible to interest the public even when prices make a turn upward. Sales of Amalgamated Copper are very small, and quotations hover fractionally above $49. Anaconda is still invisible. Montreal & Boston is dealt in sparingly, although the new consolidated company, known as the Montreal & Boston Consolidated Mining and Smelting Co., has been incorporated under Canadian laws, with a capitalization of $7,500,000. There are 1,500,000 shares of $5 par value, of which 1,300,000 shares will be issued for the properties acquired and to provide $150,000 for working capital, and the balance will be held as treasury stock. Greene Consolidated, of Mexico, is up again, selling at $15@$15.125.

Ontario Silver, of Utah, is lower at $4 on sales. Some strength is shown in Brunswick Consolidated, of California, which is selling at 15c., as a result of the uncovering of good ore recently.

Colorado shares are very quiet, primarily because of the labor disturbance, notably in the Cripple Creek district.

Comstock shares are weaker, being led by Ophir at $4.15, and Consolidated California & Virginia at $1.35.

At the annual meeting of the Consolidated Stock and Petroleum Exchange on June 13, the regular ticket was elected. The president is Lewis V. F. Randolph; first vice-president, Mortimer H. Wager; second vice-president, C. H. Badeau; treasurer, E. R. Grant, and chairman, Valentine Mott.

Boston. June 14.

(From Our Special Correspondent.)

It has been another dull week in mining shares. Brokers, however, feel quite encouraged in the demand for sound investment stocks. Copper mines certainly have had a prosperous season. Osceola directors are expected to declare a $2 dividend at least, against $1 last December. United States Mining directors will meet later in the month and declare an initial dividend of $1 per share. Utah Consolidated is booked for $1.50 dividend this week, and a quarterly of 50c. will probably be paid by the Parrot Co. next month.

A drive was made at Shannon Friday, which put it down a fraction to $5.75. There has been no sale since. Some little demand is noted for Quincy and Tamarack. The former is up $5 to $85, and Tamarack $4.50 to $94.50. Calumet and Hecla is $11 higher at $455, and Wolverine is up $1 to $72. Utah Consolidated continues to be absorbed and is up to $35.75. Adolph Lewissohn is credited with possessing 40,000 shares and is the largest individual owner of Utah stock. Rogers and Wm. Rockefeller are said to have about 71,000 shares between them. Parrot sold at $24.75 to-day, and Osceola is firm around $59. Centennial sold at $19@19.50 to-day. Advices from the mine state that one stamp head will be placed in commission about July 5. Copper Range holds close to $42, closing a fraction above this to-night. Bingham is quiet around $21, Mohawk at $40, or better, and United States around $20. The Bingham Co. contemplates an addition to its four stack smelter. Isle Royale has been quiet at $7.75@7.50, and Old Dominion at $13@12.50.

Colorado Springs. June 10.

(From Our Special Correspondent.)

Trading in Cripple Creek shares is very light. Purchasers seem to be inclined to withhold their orders as a result of the recent labor troubles. El Paso, which sold last week for 85⅞c., brought 85½c. to-day. Elkton dropped from 67½c. to 66¾c., and Portland from $1.65 to $1.60.

Salt Lake City. June 11.

(From Our Special Correspondent.)

The stocks sold on the Salt Lake Stock and Mining exchange during the week brought $41,240.43. The market was dull and prices were fairly steady. Silver King paid its regular dividend of $100,000 on June 10, and showed a sale of 100 shares at $51. Butler-Liberal was among the active traders but did not fluctuate a half a cent a share. The same can be said of Consolidated Mercur, which held close to 24c. The Utah mine has announced a 1c. dividend. The stock was bought at 50c. a share. There was some call for Montana-Tonopah, which sold up to $2 a share. Uncle Sam Consolidated has displayed unusual activity since the annual meeting, and has moved up several points. Tetro, which is to pay its initial dividend of $3,000 on June 25, sold over 11,000 shares at 32@34c.

San Francisco. June 9.

(From Our Special Correspondent.)

The North End stocks were adversely influenced by the sudden decline in Ophir to $4.10, and Mexican to $1.15. To offset this weakness Caledonia rallied to 79c., Overman to 32c., and the Gold Hill stocks exhibited much strength.

Business in Tonopah shares has improved materially. McNamara showed the most activity at 26@33c., Midway at 36@40c., Montana at $1.90@$1.95, and Belmont at 66@68c. per share.

Oil shares were quiet.

Monterey. June 7.

(From Our Special Correspondent.)

Exchange on New York was very steady during the week at 217.5, but closed Saturday at 217.

In mining stocks those of El Oro district brought: Victoria, $62; Reforma, $19; Aurora, $15; Dos Estrellas, $21.30; Antares, $2; National, $11; Equidad, $12; La Union, $50, and Buen Despacho, $65; Barreno, San Luis Potosi, $66, and Santa Fe, Oaxaca, $25. Of Pachuca properties San Rafael brought $17.25; Santa Gertrudis, $80.75, and Soledad, $7.15.

COAL TRADE REVIEW.

New York, June 15.

ANTHRACITE.

The anthracite coal trade continues active in practically all consuming territories. The removal of the embargo on lake shipments has started a lot of coal west, and the companies from now on will be giving chief attention to their western trade. This will have its natural effect on business in the East. There does not appear to be any chance for an immediate change in the demand for small sizes which continue to accumulate with producers. The shipments for May were heavy, 5,285,079 tons, one of the best outputs for a single month on record. The shipments for five months were 23,528,412 tons, compared with 26,448,455 in 1903.

As regards the labor situation at the mines, concerning which some wild stories have appeared in the newspapers recently, the gist of the matter is that certain local leaders of the United Mine Workers are apparently trying to make trouble. This at least appears to be the real cause of the dispute at the mines of the Lehigh Coal & Navigation Co. Certain mines were closed, and certain miners who refused to take the places offered in other mines of the company were discharged. When the mines that were closed started work again these discharged men wanted their old places back. Being told that they were no longer in the company's employ, they interested local leaders of the union, and to make out a case for the men these leaders have asserted that the company is blacklisting employees who were members of the union. Practically the men had no standing at all before the Conciliation Board, though it has heard their grievance.

In the Northwest trade is quiet. A lot of coal is expected to arrive at upper lake docks, and then the movement of coal to interior points may become heavier. In Chicago territory demand during the week has been heavier than for some time, owing probably to the arrivals of coal by lake. Orders from country yards take this coal as fast as it arrives. Along the lower lakes and in Canadian territory the demand is generally good. Some coal that had accumulated along the railroads is now moving off more freely, but in general the Canadian demand is pretty well supplied. Along the Atlantic seaboard buying is still heavy, in spite of the attention that operators had been giving this territory for some time. In general the tonnage is being pretty evenly distributed. The retail markets are naturally quiet, but, as many householders did not buy as heavily this spring as last, the outlook for retail dealers later on is most promising. The Lehigh Valley Co. announces a temporary reduction on pea and buckwheat sizes to $2.45 and $1.95, f. o. b., respectively.

BITUMINOUS.

The Atlantic seaboard bituminous trade continues quiet and dull. Several small mining companies have shut down, and a number of these in all probability will never reopen their mines. So quiet is the market that even producers of special grades are curtailing output. The consumption of coal is affected both by the general industrial pause and by the liberal water power available for those concerns using it. The proposed reductions of wages in certain fields is under consideration by some influential companies.

The trade is looking for freight rates in the coastwise vessel market to be reduced as an inducement to consumers. Already an inclination is shown to make such reductions at all shipping ports, except Norfolk and Newport News. In the far East trade is dull, and apparently even shipments on contracts are falling off. Along the Sound there is little doing, demand being lighter than in several years. At New York harbor points also trade is quiet, with plenty of coal offered for sale. In all-rail territory there may be a little more activity, but in general trade is dull. Some slight curtailment of all-rail shipments to New England points is reported.

Transportation from the mines to tidewater is good. Car supply at the mines is up to all demands. In the coastwise vessel market the supply of vessels is liberal. We quote current rates as follows: Providence, New Bedford and Long Island Sound, 75c.; Boston, Salem and Portland, 85c.; Lynn, 95c.; Portsmouth and Bath, 90c.; Newburyport and Bangor, $1; Saco, $1.05 and towages; Gardiner, $1 and towages. From New York harbor shipping ports rates are 70@75c. to around Cape Cod.

Birmingham. June 13.

(From Our Special Correspondent.)

The production of coal in Alabama is very heavy, as preparations are being made to tide over any suspension of work by the miners after July 1. The convention of the United Mine Workers of America, Alabama district No. 20, is in session now, and the operators have been invited to attend a conference next week, beginning June 20, to consider a wages contract. There are rumors that the operators desire to treat with their employees individually. The miners are making no statements as to what they are going to ask. At present the sliding scale is in effect based on the average selling price of pig iron. It is rumored that the miners are going to ask for a flat basis, and a contract for three or five years. Many people are anxious to see the next contract for three or five years so as to eliminate the yearly uncertainty.

Considerable coal is produced in Alabama by non-union labor and this production will continue whether there is interruption in other fields or not as will that mined by convict labor. However, it is believed there will be no interruption whatsoever in the work at the mines. Railroads and other large consumers are laying in a supply which will last them two months or longer.

The demand for coke holds up well with the heavy production of pig iron.

Chicago. June 13.

(From Our Special Correspondent.)

Trade in anthracite has been fairly good the past week, orders coming in much more plentifully. The first Lake cargo arrived and started the hopes of wholesalers and retailers, probably doing more to encourage buying than anything else. Orders must run considerably behind for a month yet at least. Many consumers realize this and refrain from pressing for deliveries, though the users generally are as impatient as usual. All-rail trade is said to be good for western deliveries. The June price, applying to deliveries as soon as they can be made, is expected to quicken trade during the rest of the month.

The market for bituminous continues very quiet; there is no activity anywhere, though there is a steady demand for the lower grade western coals. These, however, are offered freely; Illinois and Indiana lump sells for $1.75@$2.25, and run-of-mine for $1.50@$1.75. Hocking is in steady though light demand at $2.85@$3.15. Smokeless is troubled with another surplus on track and has sold as low as $2.50, though the best grades keep up to $2.90 @$3.20. Gas coals are in light demand, Youghiogheny bringing $3.

Cleveland. June 14.

(From Our Special Correspondent.)

The coal situation in this territory is much better. The market is stronger and conditions permit a freer movement in every direction. The railroads, finding that lake boats are plentiful, have withdrawn their embargoes against coal destined for lake points so that during the past week the shipment up the lake has met mid-summer proportions. The question has arisen whether during the short season of navigation which remains there will be enough time for the movement of as much coal as last year. It is hardly possible there will be. The rates which are being established are the same as last year, namely 50c. to Milwaukee, and 40c. to the head of the lakes.

Prices tend to strengthen slightly. There is however, a certain offset to the starting of lake shipments, by the opening of the mines in the eighth district and the removal of strike possibilities from the surrounding three districts. The market looks as if it would be more active without gaining buoyancy. The prices for steam coal hold at about $1 at the mines both in the Pittsburg and the Ohio districts, with slack coal worth about 55c.@60c.

The coke situation is still easy and without any marked change. The prices range about $2.25 for 72-hour foundry coke; $2 for high sulphur cokes, and $1.50 for furnace coke.

Pittsburg. June 14.

(From Our Special Correspondent.)

Coal.—Nearly every mine in the Pittsburg district is now in full operation and heavy shipments are being made to lake ports. The Pittsburg Coal Co. during the past week sent over 1,000 cars to the Cleveland docks daily or nearly 50,000 tons. When the vessels move more freely the daily shipments are to be increased. Prices are becoming firmer, and it is doubtful if less than $1.10 a ton can be done on run-of-mine coal. The river mines are being operated in full and many empty coal boats and barges are here. Some additional shipments of coal to southern markets were made during the past week.

Connellsville Coke.—Over 1,000 ovens have been blown out and production has been greatly curtailed. Production last week fell off over 10,000 tons, and shipments showed a decrease of over 1,000 cars. This has affected prices, and strictly Connellsville furnace coke is quoted at $1.40@1.50 a ton, and it is predicted that July will see prices down to $1.35@1.40. Foundry coke is quoted at $1.80@2. The production last week was 208,813 tons, a decrease of 11,520 tons, compared with the previous week. The shipments aggregated 8,459 cars, a decrease of 1,073 cars, distributed as follows: To Pittsburg and river points, 3,442 cars; to points west of Pittsburg, 3,792 cars; to points east of Everson, 1,225 cars.

A meeting of the president of the United

States Steel Corporation and the subsidiary companies is being held in New York to-day. Some important matters, it is reported here, are to be acted upon. The meeting was to have been held in Pittsburg on May 25, but was postponed. It is announced that W. T. Graham, president of the American Sheet & Tin Plate Co., is to retire on July 1 and will become president of the American Can Company. His successor likely will be selected by the corporation some time this week.

San Francisco. June 8.

(From Our Special Correspondent.)

Trade continues quiet. Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, ex-car, to dealers, prices are $14 for Colorado anthracite, $11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is nominal at $14 for Pennsylvania anthracite and $13 for Cumberland. Foreign coal in cargo lots is quoted at $13 for Welsh anthracite, $8.50 for cannel and $7.50 for Wallsend and Brymbo.

Foreign Coal Trade. June 15.

There is considerable competition among bituminous producers to get export business owing to the depressed condition of the Atlantic seaboard markets and the low prices prevailing. The orders secured would look larger were competition not so keen.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of June 4 that the Welsh coal market is still quiet, but there seems to be an upward tendency growing. Quotations are: Best Welsh steam coal, $4.08; seconds, $3.90; thirds, $3.72; dry coals, $3.72; best Monmouthshire, $3.48; seconds, $3.42; best small steam coal $1.98; seconds, $1.86. Other sorts, $1.56.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptinons are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

The freight market is unchanged, except for South America, where prices are showing a slight decline. Some rates are: Marseilles, $1.30; Genoa, $1.35; Naples, $1.26; Las Palmas, $1.44; St. Vincent, $1.62; Rio, $2.04; Santos, $2.16; Buenos Ayres, $1.74.

IRON TRADE REVIEW.

New York, June 15.

Conditions in the iron and steel markets have not changed materially during the week, but generally speaking, the outlook, if no better, is at any rate no worse. The Southern furnaces continue active, and are storing iron possibly in anticipation of any suspension in coal mining after July 1. Some sales of iron for export are reported. In the Pittsburg district the pig iron market continuues dull, so far as sales are concerned, but there has been a great increase in inquiries at very low prices. Sales at $12.25 for bessemer pig iron, valley furnace, are noted. The current price for open-hearth billets sems to be about $19. Finished products, except wire and wire nails, are in slight demand. Consumers are reported to be making inquiries for third quarter delivery. No sales of iron ore are reported, but it seems to be agreed that prices have been fixed on a basis of $3.25 for bessemer old range, and $3 for bessemer Mesabi.

Birmingham. June 15.

(From Our Special Correspondent.)

There is little improvement in the Southern pig iron markets except in the export movement. Already some sales have been made for export by Alabama furnaces and shipments have been started, but there is not much ship room yet offered at reasonable freight rates. Foreign prices are about equal to those in this country, and if a reasonable freight rate can be secured and ship room found, it is not improbable that some good sales will be made.

There is but a little demand for iron in this country. The quotations are not changing much, being low. No. 2 foundry is still quoted at $9.25 per ton, with sales at $9, though there is no admission of the latter price. Shipments are moderate. The production is still heavy. In the last two months there have not been more than two or three furnaces shut down and workmen are repairing on one or two of these. There is a little accumulation of iron.

Some small sales have been made recently. Some iron has been sold into the third quarter. A noticeable improvement is expected after this month. The following quotations are given: No. 1 foundry, $9.50@$9.75; No. 2 foundry, $9@$9.50; No. 3 foundry, $8.75@$9.25; No. 4 foundry, $8.75; gray forge, $8.50; No. 1, soft, $9.50@$9.75; No. 2, soft, $9@$9.25.

There is still much activity in the local steel industry. The big steel rail plant of the Tennessee Coal, Iron & Railroad Co. at Enslay, and the steel rod, wire and nail mills of the Alabama Steel & Wire Co. are doing well. The steel plant at Gadsden should be ready for operation now in another fortnight.

The Gate City mills (Republic Iron & Steel Co.) have been in steady operation, but indications are that the plant will shut down the end of the month.

R. Preston Means, president and general manager of the Means-Fulton Iron Works, has disposed of his interests in the works at North Birmingham to R. C. Ricker, of Portsmouth, O., who will take possession at once.

Cast iron pipe foundries still have much business on hand and the plants are all working busily.

A number of pig iron sales have been made in the last three or four days, equal to the production for a week and longer. The Sloss-Sheffield Steel & Iron Co. reports sales of 19,000 tons of iron in two days and some small sales have been made at $9.50 per ton, No. 2 foundry. The amount sold, at this price, is admittedly small.

Chicago. June 13.

(From Our Special Correspondent.)

Dullness continues in the iron industry, and the prospect, according to leading sales agents, is for its indefinite continuance. Southern No. 2 is close to the $9 Birmingham mark for the largest sales, with about $9.25 for the greater number of transactions. This means $12.90 Chicago on the higher quotation. The volume of sales in the last week has been lighter than for many weeks previous, and there is hardly any selling for delivery late in the year, buyers falling back on the principle of buying small lots for immediate use. For Northern iron the demand is somewhat better than for Southern, the price ruling $13.25@$13.50. Though there is an attempt at cheerfulness on the part of sellers, they have apparently little in the local market to justify cheerfulness, and the prospects are that furnaces will go out of blast generally in the Chicago district soon.

Structural material and bars share in the depression, and general trade reports are not such as to warrant belief in a speedy recovery.

Coke is in large supply, although recovering from the slump of two or three weeks ago, and sells a little higher—$4.70@$4.80 for Connellsville. There must be a restriction of shipments before the situation can be satisfactory to the trade. West Virginia coke has been especially abundant the last week.

Cleveland. June 14.

(From Our Special Correspondent.)

Iron Ore.—Producers report that no ore has been sold but it is now agreed that prices have been fixed. Lack of action is due to the fact that consumers have enough material for present needs. The basis of prices is $3.25 for bessemer old range, and $3 for bessemer Mesabi. Shippers are making no rates but are offering to load boats now subject to the rates when made. Some boats already running are accepting these terms. Most boats loading now are owned by shippers.

Pig Iron.—The buying of foundry pig iron is strictly hand to mouth. Sales agents report that supplies are very low and that any imperative need will cause a buying movement. The reports of a cut to $12 in the valleys is not confirmed, but prices have held at about $12.25@$12.50. The market for bessemer and basic is dead and the prices are purely nominal. We quote, however, $12.25@$12.75 as approximating the market. No buying movement for second half has started.

Finished Material.—The market in finished steel may be quickly summed up by the remark that the buyers are beginning to look around a little more, but their inquiries have produced only small hand-to-mouth sales and no long term contracts. The market has a slight upturn therefore, but no particular buoyancy. An inquiry has been made for one big lot of structural but otherwise the market is confined to sales of small lots, in car loads or 100 tons. The plate trade has inclined slightly toward activity, the boiler concerns have been figuring on export business but have not closed anything as yet. The market for plates in the ship building trade is very narrow, nothing being done; prices hold steady. Reports of cuts in the billet trade are discredited owing to the light transactions.

The trade in sheets has been a little more active but prices have been going down steadily; cuts have been made in car lot shipments from the mills and these prices are down to 2.10c. for No. 27 black sheets. The quotations out of stock hold at 2.50c. for No. 27 black sheets. The bar iron trade is dull because the mills are going out of service on July 1. Bar steel trading is slow.

Old Material.—The market is slow with plenty of material offered and very little asked for. Prices are on a nominal basis and trend downward.

New York. June 15.

Pig Iron.—The local market is quiet and prices are weaker. For northern iron we quote: No. 1 X foundry, $15; No. 2 X, $14@$14.50; No. 2 plain, $13.75@$14.25; gray forge, $13. For southern iron on dock, prices are about as follows: No. 1 foundry, $13.50; No. 2 foundry, $12.75; No. 3 foundry, $12.50.

Bar Iron and Steel.—There is no improvement in demand which continues light. Refined bars are quoted at 1.495c., in large lots, with steel at the same figure. Common iron bars can be had for 1.35c. Concessions are reported.

Structural Material.—The market is very quiet indeed. Large lots at tide-water are still quoted nominally at 1.75@2c. for beams, angles and channels. Probably these prices could be shaded on a good order.

Plates.—Orders are still confined to small lots, and of these the number is limited. Sheared plates are quoted as follows: Tank, 1.25-in. and heavier, $1.75@1.85c.; flange, 1.85@2c.; marine, 1.95@2.10. It is locally reported that the United States Steel Corporation has taken orders for plates for export at rates that work out about 1c. at mill.

Steel Rails.—Quotations remain $28 for standard sections, f. o. b. mills. Light rails are quoted f. o. b. eastern Pennsylvania mills, as follows: 12-lb., $27; 20-lb., 25-lb., 30-lb., and 35-lb., $25; 40-lb. and 45-lb., $24.

Philadelphia. June 15.

(From Our Special Correspondent.)

The only change in the pig iron situation in this territory is in the willingness of a few large consumers of basic and foundry iron to buy freely for third quarter delivery at about 25c. per ton less than the best offers which makers have submitted. Both Pennsylvania and Alabama makers have recently had opportunities of securing business along this line. It is known that large consumers in western markets have also made offers of the same sort, namely to place large orders for late deliveries on their own terms. It is believed that these offers have grown out of the policy announced by some large producers of a material

restriction in output during the next two months. Large blocks of basic iron could be sold at this time if the terms of buyers were conceded. Several large lots of foundry iron are wanted and buyers are quite willing to close at any time, but the prices of makers are a little too strong. Quotations are as follows: No. 1 foundry is quoted to-day for the finer grades $5.50; No. 2 X or average grade, $14.50; No. 2 plain, about $14; southern No. 2 can be delivered at $13.75@$14, and standard gray forge at $13.50.

Billets.—The same condition underlies the billet market. Large sales could be made, but the sliding basis is not satisfactory. Large users of basic want to get away from it and make their own terms. Manufacturers who have been able to control the situation pretty well on the sliding basis idea do not care to surrender it. Until the situation is clearer there will be no large dealings in billets.

Merchant Bar.—The bar iron market is weaker. Western makers have been trifling with the base price in some way and the influence is felt here. The retail business doing is at full prices.

Structural Material.—Business is limited to the smaller bridge building requirements and to retail building requirements which in the aggregate do not represent the average capacity of structural mills. Quotations are unchanged.

Old Rails.—Old iron rails are offered at $15.50 and no sales are heard of.

Scrap.—Dealers report indifference on the part of buyers, and stock is slowly accumulating. Holders find buyers disinclined to purchase to hold at current prices. Railroad scrap is held at $14.50.

Pittsburg. June 14.

(From Our Special Correspondent.)

The iron market continues dull as to sales, but the number of inquiries is remarkable. One furnace interest yesterday received inquiries for bessemer pig iron aggregating 30,000 tons, and the total number for all grades during the week is in excess of 100,000 tons. The prices offered are extremely low, and the few sales that are being made are at unusual prices. An offer of $11.60, Valley furnace, was made today for 5,000 tons of bessemer pig iron and was promptly rejected. The lowest price of the week was $12.25, Valley, and orders at that figure will be accepted by most of the furnace interests but not for extended delivery. The outlook is not considered discouraging by producers who are confident that trade will brighten in the fall but admit that business will be very dull during the summer. Consumers who are in the market now do not actually need iron but are willing to place orders at once if advantageous prices can be obtained. It is believed here by leading iron and steel manufacturers that as is usual in a presidential year trade will be slow until late in the year when heavy business is expected on a sound basis that will continue throughout the coming year. The International Harvester Co. is inquiring for about 30,000 tons of foundry iron, but there is no indication that the business will be placed for some time. The market will not be affected when the Wheeling Mold & Foundry Co. places its order for 50,000 tons as the deliveries will extend over a period of 18 months. The iron will be used in connection with the Pennsylvania tunnel contracts. J. G. Butler, Jr., chairman of the Bessemer Pig Iron Association, has just issued his monthly report of blast furnaces. It shows that on June 1 there were 119 stacks in blast and 43 out of blast, with a daily capacity of 51,007 tons. Following is the idle capacity since the first of the year: January 1, 64%; February 1, 38%; March 1, 28%; April 1, 15%; May 1, 10%; June 1, 20%. There is no doubt now but that the idle capacity on July 1 will be fully 40%. Production is away ahead of consumption and stocks are accumulating.

The demand for finished products is falling off except in wire, nails and pipe, business in these lines being particularly good. The association price of $23 on bessemer and open hearth billets is not maintained and it is reported that orders can be placed almost anywhere at $19. It is believed that at the meeting of the Billet Association early next month the price will be reduced to that figure. Despite the low prices at which billets can be had there are few sales and none of any importance. Steel production fell off during the week, some departments in several mills in the Pittsburg district having been shut down. The only order of any size received was the closing of a contract by the Union Switch & Signal Co. with the Southern Railway Co. for signalling apparatus, which includes nine complete interlocking plants, with 174 mechanical working levers. The Pressed Steel Car Co. has started on the large orders for steel cars received last week and the big McKees Rocks plant is now in full operation.

The conference on the iron wage scale between representatives of the Amalgamated Association of Iron, Steel & Tin Workers and the Republic Iron & Steel Co. which began at Cambridge Springs, Pa., a week ago is still in session. Nothing has been accomplished so far according to the reports received. The only indication that a settlement may be reached is the fact that the conference is being prolonged. As already noted, the Amalgamated Association asks for a continuation of the present scale, the base of which is $5 a ton for puddling. The manufacturers insist that it be reduced to $4.50 a ton and also rejected a number of new foot notes introduced by the workers' committee. The existing scale expires on June 30, and unless a settlement is reached before that time all the union rolling mills of the country will be shut down. The conferences on the sheet and tin plate scales will not be arranged until the close of the iron scale meeting.

Pig Iron.—The feature of the pig iron market this week is the unusual number of inquiries for all grades, but sales are limited to small lots. Bessemer is quoted at $12.25@$12.50, valley furnace; foundry No. 2, $12.85@$13.25, Pittsburg; and gray forge, $12.50@$12.75, Pittsburg.

Steel.—Sales of bessemer and open hearth billets are reported at as low as $19, and this it is believed will be the price fixed by the association next month. Steel bars are still quoted at 1.35c., but trade is dull. Plates continue at 1.60c. but this rate is reported as being cut $1@$2 a ton.

Sheets.—Sales are somewhat heavier, probably due to the expected shut down of the union sheet mills at the close of the month. The American Sheet & Tin Plate Co. announces the price of 2.20c. on No. 28 gauge black sheets with the usual concession on large lots, and 3.20c. for galvanized.

Ferro-Manganese.—The market remains unchanged, $41.50 still being quoted for domestic 80%.

Cartagena, Spain. May 28.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—Trade continues very quiet. The only shipment this week was 2,650 tons dry ore to Glasgow. Rates of freight are a shade higher than they have been.

Current quotations for iron ore are: Ordinary 50% ore, 6s. 6d.@6s. 10d.; special low phosphorus, 7s.@7s. 6d.; specular ore, 58% iron, 9s. 3d.; magnetic ore, 60%, 11s. 3d. for lumps and 9s. 3d. for smalls. Manganiferous ores range from 14s. 3d. for 20% iron and 20% manganese down to 9s. 6d. for 35% iron and 12% manganese.

Pyrite.—Quotation for pyrite, containing 40% iron, and 43% sulphur, remains at 10s. 3d. per ton.

CHEMICALS AND MINERALS.

New York, June 15.

Sales agents report very few new orders, and say that even regular contract business is quiet. Prices are fairly firm, although a good customer will find little difficulty when asking for a rebate.

Cyanide.—Freer imports of British cyanide, to be delivered on contract. Prices remain at 19@20c. per pound.

Bleaching Powder.—Surplus arrivals are offered at a discount, as it does not pay to store. Spot sales have been made at $1.10@$1.125 per 100 lb., and it is intimated that the remainder of the Italian can be had around $1.15. Prime brands for contract delivery are still quoted on the basis of $1.20@$1.25.

Copper Sulphate.—There is a slight improvement in demand, but prices remain at $5@$5.10 per 100 lb., as to seller.

Acids.—Deliveries are fair for this season, and prices are unchanged.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, com'l.	$5.10@$5.50
Muriatic, 20°	1.60	Sulphuric, 50°, bulk, ton	13.50@14.50
Muriatic, 22°	1.75	Sulphuric, 60°, 1.05 bulk, ton	18.00@20.00
Nitric, 36°	4.50	Sulphuric, 66°, 1.20 bulk, ton	21.00@23.00
Nitric, 38°	4.75		
Nitric, 40°	5.00		
Nitric, 42°	5.50		

Brimstone.—Inactive. Best unmixed seconds for shipment are worth $22@$22.25 per ton, while thirds are about 50c. less.

Sicilian Brimstone Market.—Messrs. Emil Fog & Sons, write from Messina, under date of May 31, that the demand from northern Italy last month was exceptionally active, and exports for Italy exceed those to any other country. Exports to Italy in April were 17,375 tons, against 10,145 tons last year, chiefly refined brimstone from Catania. Prices at Catania rose 3s. to 4s. The newly established refineries at Girgenti and Licata, prospering when prices of thirds were low, have of late partly stopped working, owing to the high prices maintained by the Anglo-Sicilian Co. for crude brimstone. Exports in April of crude brimstone were unusually great, being 74,345 tons, against 59,011 tons last year. Stocks have decreased considerably, from 334,965 tons at end of March, to 288,941 tons at end of April, and will continue to do so until July or August, when the new brimstone will arrive. The favorable reports from America of the Louisiana mines are received with incredulity, the possibility of an American competition on the European markets being absolutely rejected. The improvement in freights, owing to the war, did not last. Steamers have become plentiful, and freights have declined. We quote sulphur per ton, as follows:

Best unmixed seconds, in bulk, 81s. 9d.; ground, in bags, 90s. 9d.; best thirds, in bulk, 79s. 6d.; current thirds, 77s. 9d.; refined block, in bulk, 90s. 9d., and in bags, 93s. 6d. for prompt delivery, and 91s. August-December; refined roll, in bags, 96s. 9d.@102s. 3d. for prompt, and 94s. 6d.@99s. 9d. for futures; refined roll sticks, 106s.@108s. 6d. for prompt, and 103s. 6d. @106s. for futures; sublimed flowers, pure, in bags, 109s. 3d., and 108s.; current, 101s. 3d. and 99s. 9d.; commercial, 95s. 6d. and 93s. 6d.

Exports of brimstone from Sicily in April were 74,345 long tons, making 210,763 tons for the four months this year, which compares with 207,093 tons in 1903, showing an increase of 3,670 tons. The shipments to the United States in April and the four months since January were:

	April.	January-April. 1904.	1903.
Best unmixed seconds	11,550	37,679	45,093
Best thirds	5,650	9,850	12,921
Total	17,200	47,529	58,014

The decrease in American trade this year is equal to about 18 per cent.

Pyrites.—A cargo of 3,150 tons copper pyrites has arrived at New York this week from Newfoundland. Business is seasonably quiet, and prices remain unchanged.

We quote domestic pyrites $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 9c. per unit for fines; sulphur content varies from 42@44%. Spanish pyrites, carrying from 46@52% sulphur, are quoted at 11@11.5c. per unit for lump, and 9.5@10c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—This market continues firm, particularly for future deliveries, which are quoted at $2.10@$2.175 per 100 lb., according to position. Spot is worth $2.15@$2.20. In April, the first month of the new fiscal year, Chile produced 2,549,903 qtl. and exported

1,993,287 qtl., while the world's consumption amounted to 4,766,953 qtl., leaving a visible supply on May 1 of 13,566,754 quintals. During April 69 *oficinas* were working.

The statistical position of nitrate of soda in Europe for the five months ending May 31, is shown below in long tons:

	1903.	1904.	Changes.
Exports to Europe.....	377,019	398,059	I. 21,040
Imports	575,950	657,230	I. 81,280
Deliveries	772,070	767,310	D. 4,760
Loadings for Europe June 1.	49,932	57,577	I. 7,645
Visible supply June 1.....	257,700	221,830	D. 35,870

Notable changes this year are an increase of about 6% in the exports to Europe, and a decrease of 14% in the visible supply on June 1.

Chilean Nitrate of Soda Market.—Messrs. Jackson Bros., of Valparaiso, write under date of April 30 that a fairly large business has been done in 95% at 6s. 11½d.@7s., alongside, for delivery during the year, and of monthly deliveries during the whole of 1905 and January-March, 1906, at 6s. 6d., steamer terms. In refined some interest was shown at 6s. 10½d., alongside, for monthly deliveries in 1905, but sellers would not entertain the price; latterly it was offered at this figure, but buyers were no longer interested.

In our last circular the figures of the production, exports and consumption for January to March, 1903, were wrongly given; we therefore repeat them correctly: Production, January-March, 1904, 6,331,000 qtl.; exports, 6,794,000 qtl.; consumption, 12,550,000 qtl., as against 6,981,000 qtl.; 6,877,000 qtl., and 13,305,000 qtl., respectively, in 1903. The market closes very quietly with sellers of 95%, May-June, at 6s. 11d.; July-December, 6s. 11½d., and 96%, May, 7s. 4d., and June-July, 7s. 3½d., all ordinary terms. The price of 6s. 11d., with an all-round freight of 17s. 6d., stands in 8s. 7d. per cwt., net cost and freight, without purchasing commission. Reported sales for the fortnight were 898,000 qtl., and resales 286,000 quintals.

Sulphate of Ammonia.—Buyers are few, although prices are easy at $3@$3.05 per 100 lb. for good gas liquor.

Phosphates.—Ocean freights from Florida are a little firmer, the latest charters to the United Kingdom having been made at 12s. 6d.@12s. 7.5d., and from Coosaw, S. C., at 10s. 7.5d., June sailing. There is no particular demand just now, although an order of fair size is received occasionally for Germany. Italy and France. In mining centers work is active, and shipments on running contracts are being hurried forward. Prices continue firm, and it seems likely will advance in the near future.

Phosphates are quoted as follows, per ton:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
½Fla. hard rock, 77@80%....	$7.25@$7.50	$9.89@11.10
land pebble, 68@73%..	3.75& 4.00	6.39@ 8.05
†Tenn. 78@80%.....	4.00@ 4.25	9.88@10.66
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
73@74%	2.95@ 3.20	.....
‡So. Car. land rock.....	3.00@ 3.25	.....
river rock, 55@60%.	2.75@ 3.00	5.75@ 6.56
Algerian 63@70%	....	6.82@ 7.32
58@63%	....	6.05@ 6.50
53@58%	....	4.95@ 5.00
Tunis (Gafsa)	....	5.75@ 6.50
Christmas Isle, 80@85%.....	....	11.75@12.54
Ocean Isle, 82@88%.....	....	12.54@12.98
Somme, Fr., 70@75%.....	....	10.63@11.02
Bordeaux, Fr., 60@65%.....	....	7.60@ 7.72
55@60%	....	6.44@ 6.55
Liege, Bel., 60@65%.....	....	7.00@ 7.10

* F. o. b. Florida or Georgia ports. † F. o. b. Mt. Pleasant. ‡On vessel, Ashley River, S. C.

Liverpool. May 31.

(Special Report of Joseph P. Brunner & Co.)

There is only a moderate export business in heavy chemicals, but prices keep very steady.

Soda ash is steady. For tierces, nearest range is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s. Bags, 5s. per ton under price for tierces. Soda crystals are in fair jobbing demand at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is moving off quietly, as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for Continent and a few other export quarters. Bleaching powder receives little attention from buyers and quotations are nominal at £4@£4 10s. per ton, net cash, for hardwood packages, as to market. Chlorate of potash is held for 2⅞@3d. per lb. net cash, but there is not much going on. Bicarbonate of soda continues in fair request at £6 15s. per ton, less 2½% for the finest quality in 1 cwt. kegs, with usual allowances for larger packages, also special terms for a few favored markets. Sulphate of ammonia is quiet at about £12@£12 2s. 6d. per ton, less 2½% for good gray 24@25% in double bags, f. o. b. here. Nitrate of soda is still quoted on spot at £10 5s. @£10 10s. per ton, less 2½% for double bags, f. o. b. here, as to quality, but the demand is only moderate.

METAL MARKET.

New York, June 15.

Gold and Silver Exports and Imports,

At all United States Ports in May and Year.

Metal	May		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports.	$14,488,268	$43,071,053	$18,828,653	$66,928,849
Imports.	1,462,845	10,472,512	11,208,501	42,878,021
Excess	E.$13,025,423	E.$32,598,541	E. $7,620,152	E.$24,050,828
Silver:				
Exports.	2,148,412	5,098,013	15,948,929	21,957,065
Imports.	1,612,581	1,943,988	7,930,489	10,983,827
Excess	E. $535,831	E. $3,154,025	E. $8,018,440	E.$10,973,238

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending June 10 and total from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$26,610	$274,773	$638,995	$19,266
1904.....	63,524,415	3,040,532	18,719,176	379,629
1903.....	13,586,758	2,963,074	8,066,900	982,630
1902.....	16,482,965	1,195,089	13,289,145	521,913

Gold exports were small this week, chiefly to the West Indies; but imports, led by $153,000 in coin from France, were large. Silver exports were principally to London; imports from Central America, Mexico and the West Indies.

Exports of merchandise from the United States in May were valued at $89,766,254, being $20,119,137 less than in April, and the smallest reported this year. For the five months ending May 31 the statement of the Bureau of Statistics, of the Department of Commerce and Labor, gives the following figures:

	1903.	1904.
Exports	$602,429,063	$580,415,546
Imports	430,744,732	426,747,826
Excess exports.....	$171,684,331	$153,667,720
Add excess of exports silver.....		10,973,238
Total		$164,640,958
Deduct excess of exports, gold.....		24,050,828
Balance of exports.....		$140,590,130

The movement of gold and silver in detail will be found at the head of this column.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending June 11, gives the following totals, comparison being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts.....	$903,362,000	$1,042,093,300
Deposits	886,829,700	1,109,231,200
Circulation	44,096,100	38,088,000
Specie	156,145,400	231,642,500
Legal tenders.....	75,039,200	81,227,700
Total reserve.....	$231,184,600	$312,870,200
Legal requirements.....	221,707,425	278,367,800
Balance surplus.....	$9,477,175	$34,502,400

Changes for the week were increases of $5,528,100 in loans and discounts, $10,432,300 in deposits, $806,000 in circulation, $5,019,100 in specie, $1,390,500 in legal tenders, and $3,801,525 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison is made with the holdings at the corresponding date last year:

	1903.		1904.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ass'd—	$156,145,400	.....	$231,642,500	.....
England—	182,039,175	.....	166,910,370	.....
France—	499,495,800	$224,509,900	561,716,490	$226,270,550
Germany—	172,025,000	60,440,000	177,410,000	62,335,000
Spain—	72,680,000	102,420,000	73,700,000	101,205,000
Netherlands—	19,700,500	32,944,500	27,379,000	33,019,500
Belgium—	15,680,000	7,840,000	15,756,665	7,878,335
Italy—	89,860,000	11,280,000	110,225,000	19,996,500
Russia—	388,580,000	44,015,000	423,455,000	40,565,000
Austria—	228,715,000	65,625,000	235,045,000	65,055,000

The returns of the Associated Banks of New York are of date of June 11, and the others June 9, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market is fairly steady with moderate inquiry from India at slightly lower prices. There are no new features to report.

The United States Assay Office in New York reports receipts of 39,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to June 2 are reported by Messrs. Pixley & Abell's circular as follows:

	1903	1904.	Changes.
India	£3,067,625	£4,819,303	I. £1,751,678
China	183,231	126,062	D. 57,169
Straits	206,079	58,103	D. 147,976
Total	£3,456,935	£5,003,468	I. £1,546,533

Receipts for the week were £141,000 in bar silver from New York, £2,000 from the West Indies, and £6,000 from Australia, total £149,000. Shipments were £116,500 in bar silver to Bombay.

Indian exchange continues weak, and all the Council bills offered in London have been taken at 16d. per rupee. Gold shipments from Australia to India next week will total £525,000. This movement is expected to cease, at least temporarily, as exchange has fallen below the gold export point. As a result there will likely be a better demand for drafts, which will benefit exchange.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars.....	$0.44¾	$0.46⅛
Peruvian soles and Chinese pesos.....	.40	.43⅞
Victoria sovereigns.....	4.86	4.87
Twenty francs.....	3.80	3.88
Spanish 25 pesetas.....	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

June.	Copper.				Tin, Cts. per lb.	Lead, Cts. per lb.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	Cathodes, Cts. per lb.	London, £ per ton.			N. Y., Cts. per lb.	St. Louis, Cts. per lb.
9	12¼ @12⅜	12⅛ @12¼	11⅞ @12	56¼	26¾	4.20 @4.25	4.72½ @4.75	4.55 @4.60
10	12¼ @12⅜	12⅛ @12¼	11⅞ @12	55⅞	26½	4.20 @4.25	4.72½ @4.75	4.55 @4.60
11	12¼ @12⅜	12⅛ @12¼	11⅞ @12	....	26¼	4.20 @4.25	4.72½ @4.75	4.55 @4.60
13	12¼ @12⅜	12⅛ @12¼	11⅞ @12	55⅜	26	4.20 @4.25	4.72½ @4.75	4.55 @4.60
14	12¼ @12⅜	12¼ @12⅜	11⅞ @12	55⅜	26⅛	4.15 @4.20	4.72½ @4.75	4.55 @4.60
15	12¼ @12⅜	12⅛ @12¼	11⅞ @12	56⅛	26⅛ @26¼	4.15 @4.20	4.72½ @4.75	4.55 @4.60

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars.

SILVER AND STERLING EXCHANGE.

June.	Sterling Exchange.	Silver. New York, Cts.	Silver. London, Pence.	June.	Sterling Exchange.	Silver. New York, Cts.	Silver. London, Pence.
9	4.87⅛	55⅛	25 5/16	13	4.87¼	55⅝	25⅝
10	4.87⅛	55¾	25⅝	14	4.87¼	55⅝	25⅛
11	4.87¼	55⅝	25⅝	15	4.87	55¼	25 1/16

New York quotations are for fine silver per ounce Troy. London prices are for sterling silver .925 fine.

Copper.—The dullness which has prevailed for such a long time continued practically throughout the week, and it is only during the last few days that the lower values established are beginning to attract the attention of consumers. There is reason to believe that the stocks of refined copper in first-hands are not at all excessive, and this description may become scarce for early delivery as soon as a better demand sets in. The export movement bids fair to again assume larger proportions. The closing quotations are given as 12¼@12⅜c. for Lake; 12⅛@12¼c. for electrolytic in ingots, cakes and wirebars; 11⅞@12c. for casting copper.

The market for standard copper in London, which closed last week at £55 17s. 6d., opened on Monday at £55 12s. 6d., and the closing quotations on Wednesday are cabled as £56 2s. 6d. @£56 3s. 9d. for spot, £56@£56 1s. 3d. for three months. Refined and manufactured sorts we quote: English tough, £58@£58 5s.; best selected, £59@£59 5s.; strong sheets, £70@£70 5s.; India sheets, £66@£66 6s.; yellow metal, 6⅛d.

Exports of copper from Baltimore in the week ending June 14 are reported by our special correspondent as 1,004 tons, principally to Germany. Imports were 1,159 tons copper ore from Daiquiri.

Tin has experienced quite a drop, as low as 26c. being accepted at one time. At the close, there is an improvement in the tone, the ruling quotations being given as 26⅛@26¼c. for spot, and 26@26⅛c. for futures.

The foreign market, which closed last week at £120 12s. 6d., opened on Monday at £119, declined on Tuesday to £118 10s., and the closing quotations on Wednesday are cabled as £119 5s.@£119 7s. 6d. for spot, £118 15s.@£118 17s. 6d. for three months.

Lead.—The feature of the week has been a reduction in the prices of the American Smelting and Refining Co., of $1 a ton on Tuesday. At the lower values established a more active business has developed. The closing quotations are given as 4.15@4.20c. New York, 4.07½@4.12½ St. Louis.

The foreign market is rather weak, spot lead being pressed for sale. The closing quotations are cabled as £11 7s. 6d.@£11 8s. 9d. for Spanish lead, £11 10s.@£11 11s. 3d. for English lead.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is dull, and prices are lower; Missouri brands are quoted at 4.10c., while 4.125c. is asked for desilverized.

Spanish Lead Market.—Messrs. Barrington & Holt, of Cartagena, write, under date of May 28, that the price of silver during the week has been 14 reales per ounce. Exchange has gone up 7c., making it 34.82 pesetas to £1. The local quotation for pig lead on wharf has been 66.75 reales per qtl., which on above exchange is equal to £10 16s. 2d. per long ton, f. o. b. Cartagena. Exports were 360,601 kg. desilverized lead to Marseilles.

Spelter has ruled quiet but steady throughout the week, and nothing of interest has transpired. The closing quotations are given as 4.55@4.60c. St. Louis, 4.72½@4.75c. New York.

The foreign market remains steady, good ordinaries being quoted at £21 15s. specials at £22.

St. Louis Spelter Market.—The John Wahl Commisison Co. telegraphs us as follows: Spelter is unsettled, with more sellers than buyers at 4.60c., East St. Louis.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt, of Cartagena, write under date of May 28 that notwithstanding the decline in the price of spelter, so far there has been no reduction in the price of zinc ore, which continues firm, as a result of keen competition among local buyers. Blende, 35% zinc, is quoted at 68 fr.; calamine, 30% zinc, 47 fr. per ton.

Antimony is dull and neglected. We quote: Cookson's at 7@7⅜c.; Hallett's, 6⅜@6½c.; United States, Italian, French, Japanese, Hungarian and Chinese, 5⅞@6c. per pound.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per pound.

Platinum.—Quotations are nominally $18.50 per ounce, but the tendency is upward, and higher prices are expected.

Platinum in manufactured forms is very firm. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 77c.; crucibles and dishes, 80c.; perforated ware, like cones, etc., 85c. per gram.

Quicksilver.—The New York price is $44.50 @$45 per flask, for large lots, with a slightly higher figure quoted for smaller orders. The San Francisco current price is $43@$43.50 for domestic, and $42.50@$43 for export. The London price is £8 per flask for Spanish, and £7 19s. for Italian.

Cadmium.—Current prices, as reported by Herr Paul Speier, of Breslau, Germany, are as follows: Cadmium, guaranteed, 99.5% metal, in quantities of 500 kg. or over, 700@725 marks per 100 kg., f. o. b. Hamburg, net cash, packing included.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg., at Breslau, Germany. Manganese metal is quoted 360 marks per 100 kg., f. o. b. Bremen, Germany, Manganese tin alloy, 55% is quoted 365 marks per 100 kg. for first quality, and 225 marks for second quality, both f. o. b. Bremen.

For other minor metals and their alloys, wholesale prices, f. o. b. works, are as follows:

Aluminum	Per lb		Per lb
No. 1, 99% ingots	33@37c.	Ferro-chromium (74%)	12½c.
No. 2, 90% ingots	31@34c.	Ferro-Tungsten (37%)	38c.
Rolled Sheets	4c. up	Magnesium, pure (N. Y.)	60c.
Alum-bronze	20@23c.	Manganese	$2.75
Nickel-alum	33@39c.	Mangan'e Cop. (20% Mn)	32c.
Bismuth	$2.10	Mangan'e Cop. (30% Mn)	38c.
Chromium, pure (N. Y.)	80c.	Molybdenum (Best)	$2.00
Copper, red oxide	50c.	Phosphorus, foreign	45c.
Ferro-Molybde'm (50%)	$1.25	Phosphorus, American	70c.
Ferro-Titanium (10%)	90c.	Sodium metal	50c
Ferro-Titanium (20@25%) N. Y.	55c.	Tungsten (Best)	88c.

Missouri Ore Market, June 11.

(From Our Special Correspondent.)

The highest price paid for zinc was $38 per ton, the same as last week, and the assay basis ranges from $32 to $34 per ton of 60% zinc. Lead is selling at $53 per ton.

Following are the shipments of zinc and lead ores from the various camps of the district for the week:

	Zinc, lb.	Lead, lb.	Value.
Joplin	3,153,820	351,560	$62,930
Webb City-Carterville	2,816,110	760,890	62,400
Duenweg	1,450,810	225,660	29,200
Galena-Empire	953,690	102,430	17,000
Alba-Neck	477,060	.....	8,110
Prosperity	415,280	15,970	7,065
Granby	366,000	86,000	6,325
Carthage	290,790	16,500	5,375
Badger	300,850	.....	5,110
Aurora	336,000	11,100	4,770
Oronogo	325,950	.....	4,080
Mitchell	170,970	13,130	3,425
Beef Branch	53,050	80,990	2,045
Zincite	64,050	6,490	1,200
Carl Junction	64,350	5,810	1,250
Spurgeon	55,570	27,540	1,000
Diamond	61,070	.....	975
Cave Springs	40,820	10,580	925
Reeds	40,590	.....	610
Total sales	11,436,830	1,744,650	$223,855
Twenty-four weeks	244,172,240	30,603,560	$4,902,775

Zinc value, the week, $179,120; 24 weeks, $4,049,390.
Lead value, the week, $44,735; 24 weeks, $853,385.

As soon as it was shown that several of the larger producers would not sell their ore at the present price, there began a scramble for the best ore for sale, resulting in increasing the shipment over the previous week, 2,354 tons, a very large increase, and bringing the week's shipment up to one of the largest of the year. Nor does the shipment fully indicate the larger demand, as approximately 1,500 tons more ore was purchased for shipment the ensuing week. The heavier purchases and reduced output resulted in lowering the reserve stock about 1,000 tons, against a gain of 1,700 tons the two preceding weeks.

Average Prices of Metals per lb., New York.

Mo.	Tin. 1903	Tin. 1904.	Lead. 1903.	Lead. 1904.	Spelter. 1903.	Spelter. 1904.
Jan...	28.33	28.845	4.075	4.347	4.865	4.863
Feb..	29.43	28.087	4.075	4.375	5.043	4.916
Mar..	30.15	28.317	4.442	4.475	5.349	5.057
April.	29.81	28 132	4.567	4.475	5.550	5.219
May .	29.51	27,718	4 325	4,423	5.639	5.031
June .	28.34	.....	4.210	.....	5.697	....
July..	27.68	.....	4.075	.....	5.062	....
Aug..	28.29	.....	4.075	.....	5.725	....
Sept..	26.77	....	4.243	.....	5.686	....
Oct...	25.92	.....	4.375	.....	5.510	....
Nov..	25.42	.....	4.218	.....	5.338	....
Dec..	27.41	.....	4.162	.....	4.731	....
Year	28.09	.....	4.237	.....	5.400	....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.: February, 4.717c.; March, 4.841c.; April, 5.038c.; May, 4.853c.

Average Prices of Copper.

Mo.	New York. Electrolytic. 1903.	New York. Electrolytic. 1904.	New York. Lake. 1903.	New York. Lake. 1904.	London. Standard. 1903.	London. Standard. 1904.
Jan...	12.159	12.410	12.361	12.553	53.52	57.55
Feb...	12.778	12.063	12.901	12.245	57.34	56.57
Mar..	14.416	12.299	14.572	12 551	63 85	57.321
April.	14.454	12.923	14.642	13.120	61.72	58.247
May..	14.435	12,758	14.618	13.000	61.73	57.321
June .	13.942	.....	14.212	.....	57.30	.....
July..	13.004	.....	13.341	.....	56.64	.....
Aug..	12.962	.....	13.159	.....	58.44	.....
Sept..	13.205	.....	13.345	.....	56.82	.....
Oct...	12.801	.....	12.954	.....	55 60	.....
Nov..	12.617	.....	12.813	.....	56.30	.....
Dec. .	11.952	.....	12,084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars: prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902. London, Pence.	1902. N. Y., Cents.	1903. London Pence.	1903. N. Y., Cents.	1904. London, Pence.	1904. N. Y., Cents.
Jan..	25.62	55.56	21.98	47.57	26 423	57.055
Feb..	25.41	55.09	22.11	47.89	26.665	57.592
Mar..	25.00	54.23	22.49	48.72	26.164	56.741
April.	24.34	52.72	23.38	50.56	24 974	54.202
May..	23.71	51.31	24.89	54.11	25.578	55.430
June .	24.17	52.36	24.29	52.86	.....	.....
July..	24.38	52.88	24.86	53.92	.....	.....
Aug..	24.23	52.52	25.63	55.36	.....	.....
Sept..	23.88	51.52	26.75	58.00	.....	.....
Oct...	23.40	50.57	27.89	60.36	.....	.....
Nov..	22.70	49.07	27.01	58.11	.....	.....
Dec...	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

ASSESSMENTS.

Company.	Delinquent.	Sale.	Amount.
Allouez, Mich	Sept. 26	.....	1.50
Bullion, Nev	June 24	July 14	.05
Caledonia, Nev.	May 31	June 21	.15
Hale & Norcross, Nev	May 31	June 24	.10
Mexican, Nev	June 13	July 7	.15
N. Y. Bonanza, Utah	June 7	June 28	.03
Red Slide, Cal	July 15	.....	.05
Sierra Nevada, Nev	June 8	June 27	.10
Skylark Copper, Utah	June 15	July 5	.01
Utah Con., Nev	June 6	June 27	.10
Yellow Jacket, Nev	June 10	July 13	.10

DIVIDENDS.

Company.	Latest Dividend. Payable.	Rate.	Total.	Total to date.
†Calumet & Hecla	June 31	10.00	$1,000,000	$85,350,000
Camp Bird, Colo	June 25	.24	196,800	1,459,704
*Central Lead, Mo.	June 25	.50	5,000	405,000
†General Chem., pf.	July 1	1.50	150,000	3,025,178
*Grand Central, U.	June 15	.10	25,000	1,016,205
*Homestake, S. D.	June 25	.25	54,600	12,695,350
*Kendall, Mont	June 20	.05	25,000	480,000
Le Roi No. 2, B.C.	June 9	.24	28,800	345,600
*Lightner, Cal	June 20	.05	5,113	217,293
‡Maryland Coal, pf.	June 30	3.50	65,975	1,112,110
*Mines Co. of Am.	June 20	.01¼	25,000	605,000
*Pacific C'st Borax.	June 29	1.00	19,000	1,830,500
*Penna. Con., Cal.	June 15	.10	5,150	217,975
‡Silver King, Utah.	June 10	.66⅔	100,000	7,950,000

* Monthly. † Quarterly. ‡ Semi-annually.

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	June 8 H.	June 8 L.	June 9 H.	June 9 L.	June 10 H.	June 10 L.	June 11 H.	June 11 L.	June 13 H.	June 13 L.	June 14 H.	June 14 L.	Sales.
Amalgamated, c..	$100	50⅛	49¼	49½	48⅞	49⅝	49⅝	48¾	49⅛	50	49⅜	49⅞	49¼	54,625
Anaconda, c.....	25	74	.....	.....	.....	.....	.....	.....	.....	.....	.....	73	72	300
Belcher, s.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & Belcher, s..	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Brunswick.....	1	.....	.....	15	.....	15	14	15	.....	15	.....	.....	.....	2,800
Bullion.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Caledonia, s.....	1	.....	.....	80	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Challar, s., g.....	2½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Confidence s.....	3	95	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Con.Cal.&Va., g.s.	2½	.....	.....	.....	.....	1.50	1.40	.....	.....	1.35	.....	1.35	.....	500
Con. Imperial s..	1	.....	.....	.....	.....	.....	.....	2⅛	.....	2	.....	.....	.....	1,500
Creede & Cr. Ck.g	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Cripple Creek, g..	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2⅛	.....	.....
Crown Point.....	1	.....	.....	18	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Dunkin s.....	1	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Elkton, g.....	1	.....	.....	65	.....	.....	.....	65	.....	.....	.....	.....	.....	500
El Paso, g	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Dollar	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greene Con., c....	10	14⅛	13⅜	14⅛	.....	14⅝	14¼	14⅝	14⅝	15⅛	15	15¼	15	6,305
Hale & Norcross..	3	.....	.....	.....	.....	75	.....	.....	.....	69	68	.....	.....	50
Homestake, g....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Horn Silver s 1...	20	.....	.....	1.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Isabella, g.....	1	.....	.....	28	27	.....	.....	26	.....	.....	.....	29	.....	1,800
Jack Pot.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Justice, s.....	21	15	14	.....	.....	.....	.....	.....	.....	10	.....	.....	.....	1,000
Little Chief s 1...	50	5	.....	.....	.....	.....	.....	5	.....	5	.....	.....	.....	1,000
Mexican, s.....	3	1.30	.....	.....	.....	1.30	.....	.....	.....	.....	.....	1.35	.....	300
Moulton g.....	25	.....	.....	.....	.....	.....	.....	.....	.....	19	.....	.....	.....	100
Ontario, s. 1.....	100	.....	.....	4.10	.....	.....	.....	.....	.....	4.00	.....	4.00	.....	100
Ophir, s.....	3	4.50	.....	.....	.....	4.25	.....	.....	.....	4.15	.....	.....	.....	300
Overman, s.....	2	31	30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Pharmacist, g....	1	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Phœnix, g.....	1	.....	.....	12	.....	12	11	11	.....	12	10	.....	.....	6,200
Portland, g.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.65	.....	200
Potosi, s.....	1	.....	.....	1¼	.....	.....	.....	.....	.....	.....	.....	11	.....	400
Quicksilver	100	.....	.....	¾	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Savage, s.....	3	.....	.....	.....	.....	.....	.....	26	.....	.....	.....	.....	.....	200
Sierra Nevada s..	3	.....	.....	45	.....	.....	.....	.....	.....	40	.....	.....	.....	400
StandardCon.,g.s.	10	.....	.....	.....	.....	2.45	.....	.....	.....	.....	.....	2.40	.....	150
Tennessee, c.....	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union Con., g. s...		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	46	.....	100
Union Copper....	10	1 1/16	.....	1 1/16	.....	¾	1 1/16	¾	.....	1	⅞	1	⅞	5,400
United Copper....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
White Knob, c....	10	7¾	7¼	7¼	.....	.....	.....	.....	.....	.....	.....	7⅛	.....	610
Work, g.....	1	.....	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
yellow Jacket, s..	3	.....	28	.....	.....	.....	.....	.....	.....	26	.....	.....	.....	300

c—Copper. g—Gold. l—Lead. s—Silver. Total sales, 88,066 shares

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	June 8 H.	June 8 L.	June 9 H.	June 9 L.	June 10 H.	June 10 L.	June 11 H.	June 11 L.	June 13 H.	June 13 L.	June 14 H.	June 14 L.	Sales
Allis-Chalmers....	$100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Preferred.....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Agr. Chem....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Preferred.....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Sm. & Ref....	100	53	52⅞	54⅛	52¾	54⅛	53⅛	53⅝	53½	53⅝	53⅜	54	53¼	17,215
Preferred.....	100	98	97	98¼	97⅞	98⅜	98⅛	98⅜	90	98⅝	98¼	98⅞	98½	18,369
Col. Fuel & I....	100	29	.....	29	.....	29½	29¼	30⅜	.....	30	.....	.....	.....	1,150
Col. & H. C. & I....	100	.....	.....	.....	.....	.....	.....	10½	9½	.....	.....	.....	.....	400
Crucible Steel....	100	4⅝	.....	4½	.....	.....	.....	.....	.....	4½	.....	4½	.....	385
Preferred.....	100	35½	.....	35½	34¾	35	34¼	34	.....	34¾	.....	34¾	.....	444
General Chem....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Preferred.....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mong. R. Coal....	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Preferred.....	50	24	23⅞	.....	.....	23	21¾	21½	20¼	21	.....	21	.....	1,648
National Lead....	100	21⅝	20⅜	21⅞	21	21½	21	21⅞	21⅝	22	21¾	21⅞	21⅝	13,425
Preferred.....	100	.....	.....	92	.....	.....	.....	93	.....	93¼	.....	94¼	93½	804
Phila. Nat. Gas....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Preferred.....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburg Coal....	100	.....	.....	.....	.....	.....	.....	15	14⅜	14⅜	.....	.....	.....	215
Preferred.....	100	55	54¾	55	54¾	55	54⅞	55	54¾	55	.....	55	.....	801
Republic I. & S....	100	6⅛	.....	6¼	.....	6⅜	6¼	6⅜	.....	6⅜	.....	.....	.....	1,050
Preferred.....	100	39	.....	.....	.....	42½	39	41	.....	40¾	.....	42	.....	4,970
Sloss-Shef S. & I..	100	35¼	35	.....	.....	.....	.....	.....	.....	35⅛	.....	.....	.....	300
Preferred.....	100	.....	.....	.....	.....	85	.....	.....	.....	.....	.....	85	.....	40
†Standard Oil.....	100	628	.....	628	626	.....	.....	.....	.....	.....	.....	.....	.....	3
Tenn. C.I. & R.R..	100	34	.....	33¾	.....	35	34	35⅜	35½	35½	34½	35	.....	5,795
U.S. Red. & Ref...	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
U.S.Steel Corp....	100	9⅛	9	9⅛	9	9¼	9	9⅛	9⅛	9¼	9	9¼	9⅛	12,270
Preferred.....	100	54⅝	53¾	54¼	53⅞	54¾	54	54⅞	54⅝	54⅝	53¾	54¾	54⅛	78,567
Va.-Car Chem....	100	24	.....	24½	.....	24¾	.....	25½	25	26½	.....	27	26	1,400
Preferred.....	100	100⅜	.....	.....	.....	101	100¾	101¼	101	101¼	.....	101	.....	1,356

*Pittsburg exchanges; all others, New York. Total sales, 180,931.

SAN FRANCISCO.

Company.	Location.	June 2 H.	June 2 L.	June 3 H.	June 3 L.	June 4 H.	June 4 L.	*June 6 H.	*June 6 L.	June 7 H.	June 7 L.	June 8 H.	June 8 L.	Sales
Golden Anchor..	Nev..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
MacNamara	Nev..	17	.....	21	17	20	19	.....	.....	25	21	32	28	84,953
Mont. Tonopah..	Nev..	1.80	.....	1.90	1.85	1.95	1.90	.....	.....	1.85	1.82½	1.95	1.87½	7,050
Stand'dCorMgCo	Cal..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ton. Belmont....	Nev..	68	.....	68	.....	68	67	.....	.....	68	.....	68	66	2,676
Ton. Midway....	Cal..	37	.....	38	37	38	.....	.....	.....	37	28	40	36	8,807
Ton. Mg. Co....	Nev.	.....	.....	8.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Ton. North Star.	Nev..	.....	.....	.....	.....	28	.....	.....	.....	.....	.....	.....	.....	400
Ton. & Salt Lake	Nev..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Total sales, 104,186 shares.
*Quotations not received.

SAN FRANCISCO (By Telegraph).

Company.	June 13.	June 14.
Belcher	.27	.24
Best & Belcher	1.20	1.10
Caledonia	.71	.71
Challenge Con.	.14	.14
Chollar	.12	.11
Confidence	.95	.95
Con. California & Virginia..	1.30	1.25
Crown Point	.16	.15

Name of Company.	June 13.	June 14.
Gould & Curry	.23	.20
Hale & Norcross	.72	.65
Mexican	1.30	1.20
Ophir	4.15	3.90
Overman	.28	.23
Sierra Nevada	.39	.35
Union Con	.46	.44
Yellow Jacket	.25	.24

BOSTON, MASS.

Company	Par val	June 8 H.	June 8 L.	June 9 H.	June 9 L.	June 10 H.	June 10 L.	June 11 H.	June 11 L.	June 13 H.	June 13 L.	June 14 H.	June 14 L.	Sales.
AdventureCon.,c	$25	1⅛	.....	.....	.....	1⅛	.....	1¼	.....	1⅛	.....	1⅛	.....	285
Allouez, c.	25	5⅜	5⅛	5½	.....	5⅜	.....	.....	.....	.....	.....	5⅜	.....	550
†Amalgamated,c.	100	50¼	49¼	49¼	49⅛	49⅜	49⅜	49¾	.....	49⅛	49⅛	50	49⅛	9,462
Am. Z. L. & Sm..	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Anaconda, c. s...	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arcadian, c.....	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic, c.....	25	.....	.....	.....	.....	21⅛	20⅝	21	20½	.....	.....	8	.....	10
Bingham Con....	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	21	.....	320
Bonanza Dev. g..	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calumet & Hecla	25	.....	.....	4.46	.....	4.46	4.45	4.50	.....	4.50	.....	4.55	4.50	48
Centennial, c	25	19⅜	19	.....	.....	19	.....	19⅛	19¼	.....	.....	19⅛	19	418
†Central Oil.....	25	.....	.....	.....	.....	.....	.....	.....	.....	9	.....	8⅞	8⅛	670
Con. Mercur, g...	5	25	24	25	24	.....	.....	.....	.....	25	.....	28	27	2,720
Copper Range ..	100	42⅜	41½	42	41¼	42	41⅞	42¼	42	42½	42⅛	42¼	42	2,282
†Daly West, g.s.l	20	24⅜	24	24⅛	23¾	24	.....	24	.....	24	23½	24	23¾	515
Dominion Coal...	100	58	57¼	57	56	57	55	.....	.....	59	54	54	.....	915
Preferred.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.10	.....	5
Dominion I. & S.	100	9	.....	8½	.....	8½	7⅞	7¾	.....	7½	7¼	.....	.....	1,290
Elm River, c.....	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1⅞	.....	50
Franklin, c.....	25	.....	.....	7	.....	.....	.....	.....	.....	6⅞	.....	.....	.....	200
Granby Con.....	10	.....	.....	.....	.....	3⅜	3¼	3½	.....	.....	.....	3 3/16	3 1/16	2,750
Guanajuato Con.	5	.....	.....	1¼	1⅛	.....	.....	.....	.....	1⅛	.....	.....	.....	260
Isle Royal Con...	25	.....	.....	.....	.....	7⅞	7⅜	7½	.....	7½	.....	.....	.....	285
Mass Con., c....	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3¼	.....	10
Mayflewer, c	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Michigan, c.....	25	.....	.....	.....	.....	3½	.....	.....	.....	3⅜	.....	.....	.....	235
Mohawk, c.....	25	40¼	40	40	39⅞	39¾	.....	40	.....	40⅜	40	40¼	40	872
Mont. Coal & C..	25	4⅛	3⅞	4 7/16	.....	4⅛	.....	4⅛	4⅜	4¼	.....	4¼	.....	1,853
Mont'l & Boston.	5	.....	.....	.....	.....	50	.....	.....	.....	.....	.....	.....	.....	50
New Idria, q.....	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Old Colony, c....	25	.....	.....	50	.....	.....	.....	.....	.....	75	.....	.....	.....	100
Old Dominion, c.	25	.....	.....	13	12⅞	.....	.....	.....	.....	12⅛	.....	.....	.....	250
Osceola, c.....	25	59	58	58⅛	58	58½	.....	59	.....	59¼	59	59½	.....	377
Parrot, s. c.....	10	23¾	.....	24⅜	24¼	.....	.....	24⅜	24	.....	.....	.....	.....	1,436
Phœnix Con, c...	25	1¼	.....	.....	.....	1½	1¼	.....	.....	1⅜	.....	.....	.....	140
Quincy, c.	25	80	.....	.....	.....	81¼	82	84	.....	.....	.....	86	84	148
Rhode Island, c..	25	.....	.....	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
Santa Fe, g. c....	10	.....	.....	1¼	.....	1¼	.....	.....	.....	.....	.....	.....	.....	400
Shannon, c.	10	6⅜	6¼	6⅛	6⅛	6¼	5¾	6	.....	.....	.....	6⅛	.....	2,445
Tamarack, c.....	25	92	.....	.....	.....	92	.....	.....	.....	.....	.....	94½	93	52
Trinity, c.....	25	3¾	.....	3¾	.....	3⅞	3¾	.....	.....	.....	.....	3⅜	.....	510
Union C., T. & M.	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
United States, g..	10	19⅜	19⅝	20	19¾	.....	.....	.....	.....	20	.....	20	.....	1,120
U. S. Coal & Oil..	25	.....	.....	9⅞	9⅛	9¼	.....	9⅞	9⅛	9 1/16	.....	10	9⅞	500
Utah Con., g. c...	5	35⅛	34⅜	35	.....	35	.....	35	34¼	35⅛	35	35⅜	35	3,513
Victoria, c.....	25	.....	.....	.....	.....	2¼	.....	2¼	2⅛	.....	.....	.....	.....	220
Winona, c.....	25	5⅞	5¾	5⅞	.....	5¾	.....	5⅝	.....	5⅞	.....	5⅝	5½	770
Wolverine, c.....	25	71¼	.....	71½	.....	71½	.....	72	71½	72	.....	72	.....	108
Wyandot, c.....	25	.....	.....	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	110

c—Copper g—Gold. l—Lead. q—Quicksilver. s—Silver. Total sales, 38,244 shares.

COLORADO SPRINGS, COLO.

Company.	Par Val	June 4 H.	June 4 L.	June 6 H.	June 6 L.	June 7 H.	June 7 L.	June 8 H.	June 8 L.	June 9 H.	June 9 L.	June 10 H.	June 10 L.	Sales
Acacia.....	$1	7	6	7	.....	7	.....	7	5¾	6¼	5⅝	6½	6	2,000
Anaconda.....	5	14	12	12⅛	11½	12⅛	11½	11½	.....	11½	.....	11½	.....	2,000
Colo. City & M....	1	2½	2	.....	.....	2¼	2	2½	2	2¼	2	2⅜	2	.....
C. K. & N.....	1	34	31	33¾	31	35	31	.....	.....	33½	31	35	31	.....
Cripple Ck. Con...	1	8⅞	7¾	8¼	8	8	7⅞	8	7¾	8⅛	7⅞	8⅛	7⅞	18,500
Des Moines.....	1	2¼	1½	4	2⅜	2¼	1½	2¼	1½	2¼	1½	2¼	1⅝	.....
Doctor-Jack Pot..	1	4½	4⅜	4⅝	4½	4⅝	4⅜	4⅝	4½	4⅝	4⅜	4⅝	4⅜	9,500
Elkton Con.....	1	66½	68½	68	67¼	68½	68¾	68½	67	68½	67	68⅜	67⅝	9,550
El Paso.....	1	86	86¼	86⅜	86½	86½	85½	85	84¼	85½	84¾	85½	84⅝	10,400
Gold Dollar Con..	1	5	4⅞	5	4⅝	4⅞	4¾	5	4⅝	5	4	4⅞	4¼	5,000
Gold Sovereign...	1	5⅞	5¾	6	5⅝	5⅞	5¾	6	5¼	5¼	5	5½	4⅞	20,000
Golden Cycle.....	1	48	45	48	45	48	45	48	43	48	45½	48	44	.....
Golden Fleece....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hart.....	1	3½	2½	3½	2½	3½	2	3½	2	3½	2½	2	.....	.....
Isabella.....	1	30½	28	28⅜	28	29½	28	28¾	28	28¼	27	28⅛	28	5,450
Jack Pot.....	1	9	.....	9	4½	9	4½	9	4½	9	4½	6½	4½	.....
Keystone.....	1	4⅞	4¾	5	4½	5½	4⅞	5½	4⅞	4¼	4¾	5	4¾	19,000
Last Dollar.....	1	40	.....	46	.....	40	.....	46	.....	40	.....	48	.....	.....
Lexington.....	1	4	3⅜	3⅞	3¼	4	3⅝	5½	4⅜	4	3	3⅞	3½	5,000
Little Puck.....	1	3⅞	3⅝	4	3⅝	3¾	3	6	.....	3¾	3½	3¾	3¾	12,000
Mollie Gibson....	1	6	.....	6	.....	6	.....	8¼	7	6	.....	6	.....	.....
Moon-Anchor.....	5	9	7½	8¾	7¾	8¼	7¾	8½	7	8	7⅜	7½	7	.....
New Haven.....	5	3½	3	3½	3	3½	3	3½	2⅝	2½	2¼	3½	2⅜	3,000
Old Gold.....	1	9⅜	9¼	9⅜	8⅝	9¾	8¼	9	8½	9¼	8½	9¼	8⅝	3,000
Pharmacist.....	1	4	3⅜	4	3½	4	3½	4	3½	4	3½	3⅜	3½	1,000
Pinnacle	1	3	.....	3	.....	3	.....	3	.....	3	.....	3	.....	.....
Portland	1	1.72	1.60	1.74	1.63	170	.....	1.70	.....	1.70	1.50	1.69	1.50	800
Vindicator Con..	1	60	.....	60	.....	59	.....	65	60	65	60½	64¾	60	.....
Work.....	1	7	6¾	7	6¾	7	8¾	7	6⅞	7¼	7	7½	7	2,000

*Holiday. Total sales, 128,200 shares.

COLORADO SPRINGS (By Telegraph).

Company.	June 13 H.	June 13 L.	June 14 H.	June 14 L.
Anaconda.....	.14	.11½	.14	.12
Cripple Ck Con...	.08⅝	.07¾	.08⅝	.08
C. K. & N.....	.35	.30	.34	.31½
Doctor-Jack Pot..	.04½	.04	.....	.....
Elkton Con	.69½	.67½	.70	.69
El Paso.....	.88½	.8 1/4	.88	.87⅜
Gold Dollar Con.	.05	.04⅞	.....	.....
Gold Sovereign...	.06½	.05⅝	.06	.06⅛
Isabella	.29½	.28¼	.29½	.29¼

Company.	June 13 H.	June 13 L.	June 14 H.	June 14 L.
Jack Pot.....	.09	.04½	.06	.04
Last Dollar.....	.40	.....	.....	.....
Mollie Gibson....	.06	.....	.....	.....
Moon Anchor.....	.08	.06⅞	.08¼	.07
Old Gold.....	.09⅜	09	.....	.....
Pharmacist.....	.03¾	.03¼	.03¾	.03⅝
Portland.....	1.62½	1.60	1.70	.....
Vindicator.....	.65	.60	.60	.....
Work.....	.07⅛	.06⅞	.07⅛	.07

*Quotations not reported.

PHILADELPHIA, PA

Company	Par val.	June 8 H.	June 8 L.	June 9 H.	June 9 L.	June 10 H.	June 10 L.	June 11 H.	June 11 L.	June 13 H.	June 13 L.	June 14 H.	June 14 L.	Sales
Am. Cement.....	10	.....	.....	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	12
Cambria Iron....	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cambr'a Steel ..	50	18½	.....	18½	.....	18¼	.....	18⅞	18¾	18⅝	.....	18⅞	.....	741
Int. Smokel's Pd.	100	.....	.....	15	.....	.....	.....	.....	.....	.....	.....	.....	.....	50
Int Sm. Pd. Pfd.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lehigh C. & N....	50	74	73	74½	74	74½	74½	.....	.....	75¼	74⅝	.....	.....	1,103
*Mont. Tonopah.	1	.....	.....	.....	.....	2.00	.....	.....	.....	2.10	2.08	2.16	2.14	.....
Philadelphia....	50	38¾	38⅝	38¾	38⅝	.....	.....	38⅛	.....	38⅝	38⅜	38½	.....	528
Phila. Pfd.....	50	44½	.....	44	.....	.....	.....	.....	.....	.....	.....	44½	.....	57
*Tonopah.....	100	.....	.....	8.50	8.12½	8.75	.....	8.75	8.50	8.75	8.62½	9.00	.....	.....
*Tonopah, Belm.	1	68	.....	68	.....	68	.....	.....	.....	68	.....	.....	.....	.....
United Gas & C'l.	50	83	.....	.....	.....	83	82¾	83	.....	.....	.....	83	.....	211
Westmoreland C.	50	.....	.....	75	.....	.....	.....	75½	.....	.....	.....	76	.....	22

*Sales not given. Total sales 2,724.

STOCK QUOTATIONS

ST. LOUIS, MO.* June 11.

Name.	Par Val.	Prices. Bid.	Ask.	Name.	Par Val.	Prices. Bid.	Ask.
Am.-Nettie, Colo....	$10	$0.11	$0.15	Columbia Lead, Mo.	$10	$3.50	$4.50
Catherine Lead, Mo.	10	1.50	2.00	Con. Coal, Ill.....	100	16.00	18.00
Central Coal & C....	100	60.00	61.00	Doe Run Lead Mo.	100	110.00	115.00
Central C. & C., pf..	100	69.00	71.00	Granite Bimet. Mt..	10	.35	.39
Central Lead, Mo...	100	110.00	115.00	St. Joe Lead, Mo,...	10	14.50	15.50

*By our Special Correspondent.

SALT LAKE CITY.* June 11.

Company	Par Val	High	Low	Sales.	Name of Company	Par Val	High	Low	Sales.
Ajax	10	.09	.09	800	May Day	¼	.02½	.02¼	9,800
Butler Liberal	1	.13⅛	.12⅝	5,500	Martha Wash	....	⅝	⅝	12,000
Carisa	1	.06	.06	300	N. Y. Bonanza	1	.04⅝	.03	6,500
Century	1	.72½	.71½	300	Sacramento	5	.14	12⅝	3,000
Con. Mercur	5	.24¾	.24	4,300	Silver King	20	51.00	51 00	100
Daly Judge	20	4.25	4.10	300	Star Con	1	.12¼	.11⅞	9,100
Daly West	1	24.00	23.50	642	Tetro	1	.34¾	.32	11,200
Grand Central	1	4.80	4.60	1,520	Uncle Sam, Con	1	.50	.50	7,200
La Rene	....	.06	.05	2,600	Utah	....	....	....	200
Little Chief	1	.02	.01⅞	3,000	Victor Con	1	.01⅝	.01⅜	3,000
L. Mammoth	1	.19	.18	700	Yankee Con	1	.34	.32	900

*By our Special Correspondent. All mines are in Utah. Total sales, 83,862 shares.

DULUTH, MINN. May 28.

Company	Par Val.	Bid.	Asked.	Company	Par Val.	Bid.	Asked.
Calumet & Arizona	$10	$100	$105	Lake Sup. & Pitts Dev.	$10	$145	$150
Calumet & Bisbee	10	3.00	4.50	Pitts. & Duluth Dev.	15	33.50	36.00
Calumet & Cochise	10	5.00	5.50	Shakespeare	10	....	.20
Calumet & Pittsburg	10	25.00	28.00	United Mexican	10	....	.50
Higgins Development	10	2.00	2.50	Wolverine & Arizona	10	3.50	....
Junction Development	15	18.00	21.00	Yaqui	10	....	1.00

TORONTO, ONT. May 21.

Company.	Par val	Prices. High.	Low.	Company.	Par val	Prices. High.	Low.
Black Tail, g	$1	....	....	Mountain Lion, g	$1	....	....
Cariboo-McKin	1	....	....	Payne, s. l	1	.13	.09
Cariboo-Hydr	1	....	....	Rambler Carib	1	.26	.22
Center Star, g. s	1	.28	.25	St. Eugene, g. s	1	.50	.42
....	....	....	....	War Eagle Con	1	.14	.10
....	....	....	....	White Bear	1	.04½	.03½

g—Gold. l—Lead. s—Silver.

MEXICO. June 3.

Company.	Shares Issued	Prices, Mex. Bid.	Ask.	Company.	Shares Issued.	Prices, Mex. Bid.	Ask.
Durango:				Trompillo	1,200	$1,740	$1,760
Ca. Min. de Penoles	2,500	$3,600	$3,800	San Rafael y An., aviada	1,200	710	720
San Andres de la Sierra	200	10,000	....	Soledad, aviada	670	710	715
Guanajuato:				Sorpresa, aviada	960	265	275
Angustias, Pozos	2,400	35	40	**Mexico:**			
Cinco Senores y An., aviadoras	2,000	39	42	Alacran	2,400	20	28
Cinco Senores y An., aviada	400	39	42	Aldebarren	2,000	40	45
Providencia, San Juan de la Luz	6,000	55	60	Buen Despacho	3,000	55	65
Queensland y Australia	300	10	20	Dos Estrellas	3,000	2,120	2,150
Guerrero:				La Esperanza (El Oro.)	3,000	1,500	1,500
Delfina, 1st serie	2,500	45	50	La Reformia, aviadores	2,000	38	45
Delfina, 2nd serie	2,500	35	40	Santa Ana, Esperanza	2,400	....	90
Garduno y Anexas	7,200	30	40	**Michoacan:**			
Hidalgo:				Luz de Borda, aviadora	3,000	25	30
Amistad y Concordia	9,800	81	82	Luz de Borda, aviado	1,000	16	18
Carmen, aviada	1,100	90	100	Santiago y An., Tlal	4,000	3	5
Guadalupe Fresnillo Mill	1,000	170	200	**Nuevo Leon:**			
Guadalupe Fresnillo Mine	1,400	70	80	La Fraternal	1,000	580	620
La Reina y An., aviadora	5,800	2	4	Norias de Bajan	1,000	880	920
Luz de Maravillas, aviadas	1,100	....	20	**San Luis Potosi:**			
Maravillas y An., aviador	1,680	110	150	Concepcion y An	3,000	55	58
Maravillas el Lobo	1,000	130	180	El Barreno, aviadora	2,000	63	66
Palma y An., aviador	1,800	4	8	Sta. Maria de la Paz	9,800	170	173
Refugio, aviada	12,800	680	740	San Diegoy Annexas	2,400	8	10
Santa Anay An., aviadora	900	50	70	**Zacatecas:**			
Santa Anay An., aviada	600	25	35	Asturiana y An	2,500	30	35
Sta. Gertrudis y An., aviadas	9,600	13½	15	Candelaria y Pinos	2,500	20	25
Sta. Gertrudis y An., aviadora	28,800	80½	81	Esperanza y An	2,400	6	8
Santo Tomas Apostol aviadoras	5,100	2	3	Lourdes	2,500	20	25
San Felipe de Jesus, aviadora	3,000	14	16	Luz de Minillas, pagadoras	2,000	....	....
San Felipe de Jesus, aviada	1,200	6	10	Nueva Quebradilla, aviadoras	2,400	15	25
San Rafael y An.,				Nueva Quebradilla, aviadas	600	15	25
				San Carlos y Annexas	2,500	58	62
				Sta. Maria de Gaud	2,500	58	65
				Miscellaneous:			
				Bartolome de Medina	2,000	91	95
				Naica (Chihuahua)	100	11,000	13,000
				Natividad (Oaxaca) aviadora	1,800	950	1,000
				San Francisco Hac	6,000	78	80
				Union Hacienda	3,000	290	310

LONDON. June 3.

Company.	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt. s. d.	Date.	Quotations. Buyers. £ s. d.	Sellers. £ s. d.
American:						
Alaska-Treadwell	200,000	5 0 0	1 6	Apr., 1904	4 10 0	4 15 0
*Anaconda	1,200,000	5 0 0	2 0	May, 1904	3 12 6	3 15 0
Camp Bird	820,000	1 0 0	9	May, 1904	1 7 6	1 8 9
Copiapo	112,500	2 0 0	6 10	May, 1903	17 6	1 2 6
*De Lamar	80,000	1 0 0	1 6	May, 1904	11 6	12 6
El Oro	1,080,000	1 0 0	9	Jan., 1904	1 2 6	1 5 0
Frontino & Bolivia	128,682	1 0 0	3 0	July, 1901	6 3	8 9
Le Roi	200,000	5 0 0	5 0	Nov., 1899	12 6	15 0
Le Roi No. 2	120,000	5 0 0	1 0	June, 1904	15 0	17 6
Montana	657,128	1 0 0	6	April, 1899	9	1 3
Palmarejo & Mexican	445,000	1 0 0	rts.	April, 1903	7 0	8 0
Standard	500,000	4 0	2½	Sept., 1903	2 6	3 6
Stratton Independence	1,000,007	1 0 0	6	Dec., 1903	3 6	4 0
St. John del Rey	546,265	1 0 0	6	Dec., 1903	11 6	12 6
Tomboy	300,000	1 0 0	1 0	June, 1902	1 5 0	1 10 0
Ymir	200,000	1 0 0	1 0	Mar., 1902	1 3	3 9
European:						
Linares	15,000	3 0 0	5 0	Apr., 1904	3 0 0	3 10 0
Mason & Barry	185,172	1 0 0	7 0	May, 1904	2 17 6	3 2 6
*Rio Tinto	325,000	5 0 0	37 6	May, 1904	51 2 6	51 7 6
*Rio Tinto, preferred	325,000	5 0 0	2 6	May, 1904	6 0 0	6 5 0
*Tharsis	625,000	2 0 0	7 0	May, 1904	4 2 6	4 7 6
West Australian:						
Associated	495,388	1 0 0	2 0	Jan., 1904	3 5 0	3 6 3
Cosmopolitan	400,000	1 0 0	1 0	Apr., 1904	11 3	11 9
Golden Horseshoe	300,000	5 0 0	8 0	Apr., 1904	7 16 3	7 18 9
Great Boulder	1,750,000	2 0	1 0	June, 1904	1 7 3	1 7 9
Gt BoulderPersever'ce	1,400,007	1 0 0	1 3	May, 1904	17 3	17 9
Great Fingall	250,000	1 0 0	7 0	Apr., 1904	8 5 0	8 7 6
Ivanhoe	200,000	5 0 0	7 6	Apr., 1904	7 17 6	8 0 0
Kalgurli	120,000	1 0 0	2 6	Apr., 1904	5 6 3	5 8 9
Lake View	250,000	1 0 0	rts.	Aug., 1902	1 5 0	1 7 6
Oroya-Brownhill	450,000	1 0 0	3 0	June, 1904	3 12 6	3 15 0
Miscellaneous:						
*Brilliant Central	100,000	1 0 0	2 0	June, 1904	3 0 0	3 5 0
Briseis	600,000	1 0 0	....	....	7 9	8 3
*Broken Hill	980,000	8 0	1 0	May, 1904	1 13 6	1 14 6
Mt. Lyell	275,000	3 0 0	1 3	June, 1904	15 0	16 0
Mt. Morgan	1,000,000	1 0 0	3	May, 1904	2 6 3	2 8 9
Waihi	497,412	1 0 0	4 6	June, 1904	5 15 0	5 17 6
Indian:						
Champion Reef	513,832	10 0	1 3	May, 1904	1 14 6	1 15 6
Mysore	506,043	10 0	5 6	Mar., 1904	6 10 0	6 12 6
Nundydroog	484,000	10 0	1 8	Mar., 1904	1 14 6	1 15 6
Ooregum	343,000	10 0	1 3	Apr., 1904	1 3 6	1 4 6
Ooregum, pfd	240,000	10 0	1 3	Apr., 1904	1 13 9	1 16 3
South African:						
Angelo	600,000	1 0 0	4 0	Feb., 1904	6 18 9	7 1 3
Bonanza	200,000	1 0 0	10 0	Feb., 1904	1 6 3	1 8 9
British South Africa	4,436,019	1 0 0	rts.	May, 1899	3 1 3	3 2 6
Cape Copper	300,000	2 0 0	2 6	July, 1904	3 2 6	3 7 6
Cape Copper, pfd	75,000	2 0 0	2 6	July, 1904	3 0 0	3 5 0
City & Suburban	340,000	4 0 0	8 0	Feb., 1904	6 8 9	6 11 3
Consol. Gold-Fields	2,000,000	1 0 0	....	....	6 13 9	6 16 3
Crown Reef	120,000	1 0 0	18 0	Apr., 1904	14 0 0	14 5 0
De Beers, preferred	800,000	2 10 0	10 0	Jan., 1904	18 8 9	18 11 3
De Beers, deferred	1,000,000	2 10 0	15 0	Jan., 1904	19 6 3	19 8 9
East Rand	990,000	1 0 0	5 0	Aug., 1903	7 16 11	7 18 1
Ferreira	90,000	1 0 0	3 0	May, 1904	20 15 0	21 5 0
Geldenhuis	200,000	1 0 0	6 0	Feb., 1904	5 10 0	5 12 6
Geduld	400,000	1 0 0	rts.	Mar., 1902	6 11 3	6 13 9
Henry Nourse	125,000	1 0 0	10 0	Feb., 1904	8 10 0	8 15 0
Jubilee	50,000	1 0 0	5 0	Feb., 1904	4 12 6	4 17 6
Jumpers	100,000	1 0 0	2 6	May, 1904	3 2 6	3 7 6
Langlaagte	470,000	1 0 0	2 0	Feb., 1904	3 17 6	4 0 0
May	288,750	1 0 0	3 6	Feb., 1904	4 1 3	4 3 9
Meyer & Charlton	100,000	1 0 0	5 0	Jan., 1904	5 10 0	5 15 0
Modderfontein	200,000	1 0 0	rts.	Apr., 1902	9 5 0	9 7 6
Namaqua	94,331	2 0 0	3 0	Dec., 1903	2 17 6	3 2 6
New Jagersfontein	200,000	5 0 0	10 0	June, 1904	28 0 0	28 10 0
New Primrose	325,000	1 0 0	3 0	Mar., 1904	3 16 3	3 18 9
Rand	1,795,956	5 0	4 0	Aug., 1902	10 9 11	10 14 3
Robinson	750,000	5 0 0	5 6	Feb., 1904	9 12 6	9 17 6
Robinson Deep	950,000	1 0 0	3 0	Jan., 1904	5 8 9	5 11 3
Rose Deep	425,000	1 0 0	2 6	Feb., 1904	8 7 6	8 12 6
Salisbury	100,000	1 0 0	2 0	June, 1904	1 17 6	2 0 0
Village	400,000	1 0 0	3 0	Feb., 1904	6 13 9	6 16 3
Wemmer	80,000	1 0 0	12 6	June, 1904	11 0 0	11 10 0

*Ex-dividend.

LONDON (By Cable.)*

Company.	June 8 £. s. d.	June 15 £. s. d.	Company.	June 8 £. s. d.	June 15 £. s. d.
Anaconda	3 12 6	3 15 0	El Oro	1 3 1½	1 3 1½
British So. Africa	2 1 3	3 16 3	Modderfontein	5 6 3	7 18 9
Camp Bird	1 7 9	1 7 6	Rand Mines	10 11 3	10 10 0
Con. Gold Fields	6 15 0	6 11 3	Rio Tinto	51 7 6	51 13 9
De Beers	19 7 6	19 5 0	Simmer & Jack	1 15 0	1 13 9
East Rand	8 0 7⅛	7 15 0	Tomboy	1 4 9	1 5 0

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. May 26.

Company.	Location.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Closing. Fr.
Anzin, Coal	France	....	....	290.00	5,500.00	5,500.00
Boleo, c	Lower Cal.	12,000,000	500	62.50	1,925.00	1,945.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	18.50	18.50
Courrieres, Coal	France	600,000	500	110.00	2,840.00	2,850 00
Fraser River, g	Brit. Col.	250,000	25	....	5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	2.50	89.25	89.00
Laurium, z. l	Greece	16,300,000	500	25.00	326.00	325.00
Malfidano, z	Italy	12,500,000	500	50.00	593.00	595.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	468.00	470.00
Mokta-el-Hadid, i. l	Algeria	18,312,000	500	40.00	894.00	886.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	553.00	535.00
Penarroya, Coal	Spain	....	500	45.00	1,037.00	1,069.00
Vielle Montagne z	Belgium	9,000,000	30	30.00	692.00	688.00
....	....	....	....	....	....	....

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.